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Editorial Notes

Good News in Wartime

WE are glad that the circumstances of 1940 have not sterilized initiative in the Gas Industry. A glance at two articles in to-day's "JOURNAL" will give rise to confidence, and they should stimulate thought. These articles are of no little importance, and both are on luminous flames.

First let us think for a moment of what we desire of a gas fire. One factor—and only one of several factors—is silent operation. It is a factor, however, for which the Gas Industry has striven for the past twenty-five years. For more than a decade the research staff of Radiation Limited has devoted attention to the factors which influence the sensations experienced when the human body is irradiated by the heat emitted by incandescent sources. It is, we think, now accepted that the sensations vary not only as a result of change in the intensity of the heat but also as a consequence of variation in the quality of the radiation. On July 2, 1930, we published an abstract of a Radiation patent relating to a Cobble type of inset fire heated by luminous flames. To the best of our knowledge this was the first occasion on which a brightly incandescent fire of the modern inset type was produced in which the gas was burned in the form of luminous flames and thus *silently*. In November, 1931, came the luminous flame Cobble fire—a hearth pattern fire in which a highly incandescent combustion chamber was viewed through a screen of cobbles.

Our experience with these fires supports the view that they provide a satisfying source of radiant heat for room warming. The High "Beam" fire, made available to the Industry in 1933, used the bunsen flame; the development of luminous flame fires, however, was continued. In June, 1937, it became evident that Radiation Limited would before long have available other types of gas fire which would not use the columnar type of radiant that had characterized gas fires since about 1907.

In the Spring of 1938 a number of gas undertakings, characteristically enough, afforded facilities for the testing of two new luminous flame fires, and last autumn two new Radiation models—the "Solbeam" and the "Silent Beam"—were made generally available. They embody the same principles of design as the "Cobble," but they differ completely in outward appearance. Experience with the luminous flame "Cobble" fire showed that it is possible to use a highly incandescent source for room heating without trouble due to glare, provided the bright source is broken up by contrasting dark masses. Such a fire—as we can well testify—provides restfulness to a degree which is most satisfying.

The "Solbeam" luminous flame fire, described in to-day's issue of the "JOURNAL," is of the inset type. In it the uniformly heated combustion chamber is viewed through a screen of heavy black refractory material. This fire must have particular appeal to those who wish to benefit from the advantages of using gas while in appearance the fire retains a suggestion of a solid fuel fire.

The "Silent Beam" fire—the other Radiation fire described in our pages to-day and in which the same constructional principles have been applied—is of the upright type with a refractory front of formal structure through which the incandescent combustion chamber is viewed. The form adopted for the combustion chamber permits of a "full radiator" effect being attained and thus masks detail, so that it is not possible at a glance to get a complete picture of the make-up of the fire. Appeal is made to the imagination, while its simple lines make this fire eminently suitable for 1940 schemes of furnishing.

It is to us most stimulating, as we believe it will prove to others concerned with the utilization of town gas, to know that the workers in the Radiation research laboratories, after subjecting the problems to analysis, from the psychological as well as the material standpoint, should have had the courage to persevere and overcome the difficulties encountered. The results of this breaking of new ground will, we are sure, receive the full recognition and appreciation they deserve from the Gas Industry.

Complementary Work

STIMULATING, too, is the other article we publish to-day on the application of luminous flames to gas appliances. This article is by Mr. Dean Chandler, of the South Metropolitan Gas Company, and we know that it will be very carefully studied.

During the past few years a great deal of work has been carried out on the combustion characteristics of town gas. Aeration test burners have been developed to serve as a guide as to the possible effects on the district of variations in gas quality. Alterations in the combustion characteristics of the gas supplied affect the efficiency of appliances in use, the more so with the developments which have taken and are taking place in appliance design. The greater the refinements the greater the influence of changes in gas composition and properties; and apart from thermal efficiency such changes may cause serious inconvenience to the consumer. They may cause the gas either to light back or to blow off at the burners. The main danger of changes in composition is lighting back of appliances and noise.

One of the findings reported in Institution Communication No. 223, which gave the results of work on the combustion characteristics of town gas and its constituents in the laboratories of the South Metropoltian Gas Company, was that in order to give flames of the same characteristics it will with bunsen burners be necessary not only to alter the size of gas orifice for different gases but also to adjust the supply of primary air. Burners will be required to be fitted with provision for the adjustment of both gas and air. Now this, Mr. Chandler points out, is an onerous business; and "entirely without the aid of such awkward devices. . . the non-aerated burner gives a flame of inherently greater flexibility than the bunsen flame. Indeed, the need for some flexibility in gas quality to enable manufacture to be carried out on economical lines would be met by the use of the more flexible non-aerated burner." We may also call attention to the comments of Professor Townend and Dr. Maccormac in their recent Institution Communication: "Many of the difficulties associated with the varying combustion characteristics of town gas will only disappear as supplies become more standardized. The time is hardly ripe, however, to discuss in detail the possible manufacturing methods of the future; nor yet, if there were a wide choice of equally economic supplies, would there be agreement upon the best selection from them. Some of these difficulties, but not all, may disappear with the increasing use of non-aerated flames."

Shortly after the outbreak of war we urged in these columns that research on the general economy, convenience, and efficiency of gas appliances should be continued. "It is inconceivable," we said, "that now we are at war we should 'down tools" and that when we emerge from the ordeal, whenever that may be, we should find ourselves just as we were in the September of 1939. . . . In a renewed competitive age we ought to be in a position to place before the public appliances entirely modern, and not of pre-war vintage." It is logical that at the present juncture special attention should be directed to possible changes of design in gas burning apparatus, and we are with Mr. Chandler in his suggestion that it would be advantageous to devote experimental work to the design of appliances intended, from the start, to embody luminous flame burners. Time and money spent on this work would, we feel sure, be well spent. Exemplification of this is to be had in the practical results of research by Radiation Limited to which we have referred.

The South Metropolitan Gas Company has done a great deal of investigational work on the application of luminous flames. Fresh in our mind is the article by Mr. Chandler which we published in the "JOURNAL" of November 3, 1937, and which was concerned with the use of non-aerated flames in gas ovens. This work has been extended and is the subject of Mr. Chandler's present article. The Company has produced an experimental hotplate with luminous flame burners, and greatly increased efficiencies are claimed for them, while in another direction, that of wash-coppers, the work has made possible the development of a flueless appliance in which an efficiency of about 70% is obtainable. There is much to be said for the more general use of luminous burners in the domestic field, and we have no doubt that a good case can also be made for their use in industry. The extended use of burners of the non-aerated type merits the closest attention of the Gas Industry at the present time. To-day's "JOURNAL," in which the developments to date are recorded, should serve as incentive and encouragement in this regard.

Tar Carpets

PARTICULARLY during the past five years a great deal of experimental work has been carried out on thin tar carpets; and it has been amply demonstrated that in this development, as in other branches of road construction and surfacing, tar can well maintain its position as an important modern road binder. It will be recalled that a report on the subject was published in 1937 by the South Metropolitan Gas Company; we gave an extract from it in the "JOURNAL" for Sept. 15 of that year. The report outlined two years' work on the problem, and since that time the undertaking has been steadily engaged, in collaboration with others, in improving upon the technique, and the investigations undertaken have been of very great value indeed. It will also be recalled that in 1938 specifications were issued, agreed upon by the British Road Tar Association, for "coarse," "medium," and "fine" carpets, these specifications having been based on the successful results obtained from each type over a number of years. As we have often emphasized, the success in the use of tar for roads depends on its correct application; and in this regard the specifications to which we refer, and which were the outcome of both laboratory experience and long practical trial, have served a more than useful purpose.

In our first issue for 1940 we said that one result of the war should be a keener appreciation by highway authorities of the economic advantages of tar, produced by British industry from British materials, for the maintenance and construction of roads. The need for prudent and well-directed expenditure on highways will necessitate attention being given to the preservation of existing roads and cheap forms of surfacing for the construction of new roads. The increase in motor traffic during the last few years and the consequent need for providing non-skid surfaces of good riding qualities and at reasonable cost resulted in the rapid development of thin carpeting as a method of road treatment. Thin carpets are now well established, and it has been stated, so we understand, that as far as possible thin carpets should be used for the re-surfacing of trunk roads. A Paper on the theoretical and practical considerations of tar carpets, by Mr. G. H. Fuidge, of the South Metropolitan Gas Company, has been presented, through The Institution of Gas Engineers to the Public Works, Roads, and Transport Congress. It covered the design of the carpet mixture (the grading of the aggregate and the proportion of the binder), the commercial types of tar carpet, experience in the preparation and use of coarse and medium texture carpets, and a method for the control of tar carpet manufacture.

Thin carpets—and for that matter any material which is to be used as a wearing course on modern roads—should conform to specification. There can be no doubt about this. The tolerances allowed in the specifications issued are reasonably wide, but experience has shown the real need for constant check and control. There is as yet too much "hit and miss" about road making and surfacing. We know of instances where precisely the same material was handled on the one hand by workers operating under strict surpervision, and on the other hand by untrained workers operating without any due control. In the first case the results have been completely successful; in the second, failures have been the order of the day. More failures are due to poor technique in using tar and aggregate than to faulty methods in the preparation of tar.

Mr. Fuidge, as a result of experience, maintains that the only reliable method of control is based on frequent analysis of the finished carpeting material and comparison of the results

with the specification. Unfortunately, as he mentioned in his Paper, only a few county authorities and a few of the larger firms of contractors are in a position to carry out the analysis of coated materials. It was for this reason that the South Metropolitan Gas Company offered the services of its laboratories for the control of the manufacture of carpet using the Company's binder; for the same reason other tar distillers have offered similar facilities. The Author described his undertaking's method of control; and he concluded his Paper by putting in a plea for the provision of control laboratories for all County Councils. We would emphasize his concluding comments: "The experience of the South Metropolitan Gas Company in connexion with the control of carpet manufacture would suggest that the majority of failures of road surfacings are due to inadvertent departures from the specification to which the materials were made. A nation-wide system of control in which a systematic check is made of all road materials to ensure that they conform with the appropriate specification would, with little doubt, pay for itself in the longer life of road materials and the consequent reduction maintenance costs." In a subsequent issue we shall publish an extract from the Paper.

Widening the Scope

One of the aims always in the forefront of the gas salesman's mind must be the promotion of the widest possible use of gas—the securing of (at least) that one additional gas appliance by each consumer which would make such a huge difference to the output figure in the aggregate. For this, of course, the most modern, and therefore the most efficient, equipment is a first consideration. Even to existing business, wasteful appliances constitute an ever-present menace. This is realized not only here, but in other parts of the world. While the Consumers' Gas Company of Toronto admit the decrease in the quantity of gas required for cooking and other domestic uses through the increased efficiency of the newer appliances, the recognize that it is nevertheless essential that wasteful, inefficient appliances should be replaced if they are to retain their domestic business. It has been pointed out to the proprietors that "the competition of other fuels is so intense that the failure to promote the sale of modern equipment may mean the ultimate loss of a large proportion of the residential load." In Toronto, a special effort to develop the use of gas for house heating is meeting with much success. Plans have also been completed whereby the Company will intensify their efforts towards gaining a larger portion of the domestic water-heating business. The intention is to offer customers "hot-water service," including use of the appliance and the gas required to operate it, at fixed monthly rates varying with the quantity of hot water the heaters are capable of providing.

An Example of Accuracy

As an actual fact, of course, the gas meter is a remarkably accurate instrument, which is able to remain in good operating condition, and to regain its correctness in gas measurement, for a number of years without attention; but in order to protect consumers from any failure of meters to perform accurately, the Canadian Government provides an inspection service under which every new gas meter is inspected for accuracy before it can be placed in service, and must be removed from service and re-inspected every six years. In addition to this, the Gas Consumers' Company of Toronto carry out certain tests themselves in their own well-equipped modern meter repair shop, and records of the tests of 8,766 meters, which were tested by the Company on being brought into the meter shop after having been in service from one to five years showed that the average error of the group was no more than seven one-hundredths of one per cent. slow.

Street Lighting

Since the issue of the British Standard Specification B.S./A.R.P.37 Street Lighting under War-Time Conditions, many lighting authorities are anxious to see sample fittings. The Ministry of Home Security has made it known that where such requests for sample fittings are made persons responsible for submitting them should either refrain from doing so until they have obtained a licence to mark the fittings (or are in possession of marked fittings), or they should submit a sample fitting (or at the most, two fittings) to any one lighting authority. At the same time it should be made clear that *unmarked* fittings have not yet been approved and must therefore not be put into service in a street, even for experimental purposes.

Forthcoming Engagements

Jan.

18.—S.B.G.I.—Council Meeting, 56, Victoria Street, S.W.1, 2 p.m.

19.—I.G.E.—Technical Co-ordinating Committee, 2 p.m.

23.—G.C.P.A.—Annual General Meeting, Caxton Hall, Westminster, S.W. 1, 2.30 p.m., followed by Meeting of the Committee.

23.—Southern Association.—Meeting of Eastern District Committee, 11.30 a.m.; General Committee, 2.30 p.m., Gas Industry House.

25.—Institute of Fuel.—Meeting at Institution of Mechanical Engineers, 2.15 p.m.

27.—Yorkshire Junior Gas Association.—Meeting at Leeds. Presidential Address.

31.—Gonjoint Conference of Public Utility Associations.—Eighth Annual General Meeting, Gas Industry House, 3 p.m.

Feb.

6.—Gas Research Board.—Finance Committee, 12 noon; Council, 2 p.m.

13.—N.G.C.—Central Executive Board, 11 a.m.

13.—I.G.E.—Finance Committee, 2 p.m.; Membership Committee, 2.30 p.m.

20.—I.G.E.—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2 p.m.

Personal

Owing to ill health, Mr. J. R. HEATH has retired from the position of Manager of the Stone Gas Light and Coke Company; and to fill the vacancy the Directors have appointed the Secretary, Mr. A. WINTON, Acting Manager.

* * *

By his election to the Board of Directors of the Stamford Gas Company to fill the vacancy caused by the death of his father, Mr. Edward Dalton, Mr. H. E. DALTON becomes the fifth member of his family and the representative of the third generation to serve on the Board.

Obituary

The death took place on Jan. 12 of Mr. JOHN RICHARDSON, for many years Town C'erk of Musselburgh, and also for a long period Secretary of Musselburgh Gas Company.

* * *

The death occurred at a Cheltenham Nursing Home on Tuesday, Jan. 2, of Mr. A. H. WATSON, who for the past 10 years was representative in the West of England and Wales for the Wellington Tube Works, Ltd. Prior to this time he represented for nearly 17 years the New Inverted Incandescent Company, Ltd.

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Many friends in the Gas Industry will regret to learn that on Jan. 7 Mrs. HARMAN, mother of Mr. Edwin H. Harman, died at Farringdon, Berks, at the age of 91. The interment took place on Jan. 11 in the family grave at East Ham Old Church.

Obituary

Sir Francis Goodenough, C.B.E.

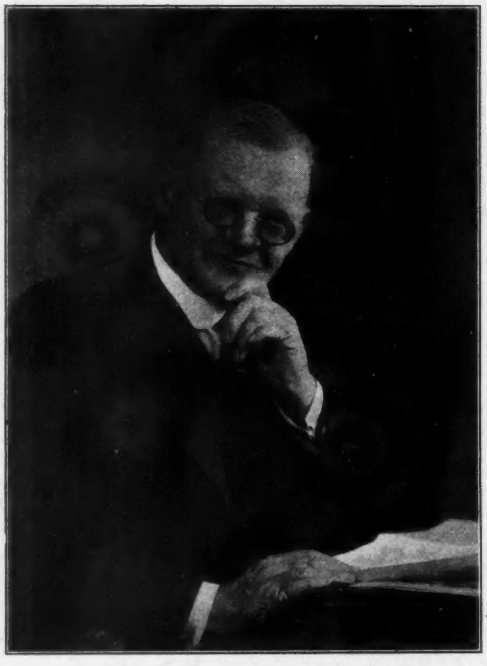
The whole Gas Industry will have learnt with profound regret of the death on Jan. 11, after a long period of ill-health, of Sir Francis Goodenough, C.B.E., at the age of 67.

Born at Newton Abbot, in Devonshire, in 1872, and educated privately and at Torquay College, Goodenough entered the service of the Gas Light and Coke Company as a junior clerk in 1888. In the opening years of the present century the Gas Light and Coke Company realized the advantages which would accrue from a separate department to deal with sales and service to the consumer, and in May, 1903, Goodenough was entrusted with the organization of this branch of the Company's activities, first with the title of Chief Inspector and latterly as Controller of what must have been the biggest gas sales organization in the world.

He was pressed to remain Chairman of the British Commercial Gas Association, which was then being re-organized owing to change of personnel. He had been its mainspring for twenty years. Freed from departmental routine, he was glad to devote his whole time to developing the Association. He was particularly anxious to see the scheme of commercial education successfully launched. The ideas which he expressed thirty years ago had been translated into fact. When the Association celebrated its twenty-fifth year, he retired from its service but continued his career as a Director and Vice-Chairman of the South-Western Gas and Water Corporation.

His interest in education remained as intense as ever. He was Chairman of the committee responsible for the International Congress on Commercial Education, which was addressed by the Duke of Windsor, then Prince of Wales. The leading delegates were presented by Sir Francis to King George V and Queen Mary at Buckingham Palace. In the course of his work for an improved system of commercial and industrial education, Sir Francis was closely associated with Lord Eustace Percy. Lord Eustace was President of the British Association for Commercial and Industrial Education, and for seven years Sir Francis served with him as Chairman.

Only a glutton for work could have tackled so many jobs with such success. With Sir Francis, the Gas Industry always came first, and his other activities were only made possible by the sacrifice of leisure hours and sometimes of health. His enthusiasm for work was infectious, as many of his colleagues have testified. His even temper and sympathetic insight made it easy for him to co-operate with all types of men. His quick eye for character and recognition of the importance of personal quality in business enabled him to get the very best work from his staff. In difficult negotiations his easy and genial manner and imperturbable good temper were invaluable assets. His greatest asset of all, perhaps, was the complete sincerity which informed every word and act. He never said a word which he did not honestly believe to be true.



Sir Francis Goodenough, C.B.E.

By the death of Sir Francis Goodenough the Gas Industry has lost one of its first and greatest salesmen, who by his untiring efforts not only enhanced the prestige of the Industry he served, but raised the status of the gas salesman—till then the Cinderella of the Industry—on to an altogether higher plane.

In 1931 Sir Francis retired from the position of Controller of Gas Sales at the Gas Light and Coke Company. He had entered its service as a boy in 1888. In 1900 he was assistant to the joint superintendents of the Rentals Department. Two years later he was commissioned to visit Berlin and draft a report on public lighting. In 1903, when the Company's "Outdoor Department" was re-organized he became responsible for it. He was then thirty-one years old. In a dozen years he had worked his way from the ranks to a key position in the world's greatest gas company.

It was at his instigation that the Gas Light and Coke Company in 1906 introduced special concessions to ironmongers to encourage them to sell gas appliances. In 1910 he was Hon. Secretary and Treasurer of the Japan-British Exhibition, and was first Chairman of the Illuminating Engineering Society in 1911. Most notable among his earlier activities was the part he played in the organization of the great National Gas Exhibition in London in 1913. In appreciation of his work as Chairman of the responsible committee he was the recipient of a presentation by Sir Corbet Woodall, on behalf of his colleagues. He was elected a Member of the Royal Institution in 1914. Another great exhibition in which he played a leading part was, of course, the gas display at the British Empire Exhibition at Wembley in 1924, in connexion with which he was unsparing in his efforts to make the Industry's contribution an outstanding success. It was for his indefatigable work at Wembley that the honour of C.B.E. was conferred upon him in 1926.

It was only natural, perhaps, that when the idea of a commercial and publicity organization to represent the Industry was first mooted Goodenough should have been an enthusiastic supporter of the scheme. He was, indeed, among those responsible for the formation of the British Commercial Gas Association in 1911 and was Chairman of the Executive Committee until the end of 1937. No more fitting monument could be erected to the memory of Sir Francis than is represented by the progress and development of the B.C.G.A., of whose work he was the inspirer for more than a quarter of a century. A well-deserved tribute was paid to his activities on behalf of the Association in the *Advertising World* of October, 1915, which spoke of him as among the most extensive advertisers in the country. "More than that," it was observed, "the advertising for which he and those associated with him are responsible is by general consent second to nothing ever issued in its essentials. In general appearance both Press advertisements and other advertising matter has been of the most pleasing character. The illustrations used would form an art gallery of no mean pretensions. . . . Stimulating suggestion, forcible argument, topical appeal, used always with a definite aim in each individual announcement have made the campaign of the B.C.G.A. what it thoroughly well deserves to be—one of the most effective in the history of advertising. It is no secret that Mr. Goodenough has been and is the prime moving spirit in the advertising work of the Association."

During the years which followed he devoted himself wholeheartedly to the promotion of gas sales and to sales publicity and educational activities. He contributed many papers to various bodies both within and outside the Gas Industry, and the recognition which was given to his work was shown by his election to the Chairmanship of the Government Committee on Education for Salesmanship, which issued its third and final report in August, 1931, and of the International Commission on Distribution; as well as his membership of the Post Office Advisory Council, the Advisory Committee of the Post Office Telephone Service, the Education Committee of the London Chamber of Commerce, and of the Governing Bodies of many educational authorities, including the City of London College.

The announcement in the King's Birthday Honours List in June, 1930, that the honour of knighthood had been conferred upon him was received throughout the Gas Industry with the greatest pleasure and satisfaction. It was regarded as an honour to the Company he had served with increasing skill and distinction for over forty years; to the British Commercial Gas Association, whose Chairman he had been since its inception; and to the Gas Industry throughout the British Empire. Above all it was regarded by everyone as an honour that had been won single-handed by sheer personal ability, energy, and consistency of purpose.

Among his many interests, he was President of the Incorporated Sales Managers' Association from 1929 to 1934, following his Chairmanship of that body from 1926 to 1929; President of

the National Association for Salesmanship, 1932-34; President of the Association for Education in Industry and Commerce (now the British Association for Commercial and Industrial Education), 1932-34; President of the Incorporated Society of British Advertisers; President of the Illuminating Engineering Society; Chairman of the Gas Education Committee of The Institution of Gas Engineers; Joint Hon. Secretary of the National Gas Council; Member of the Executive Council and Education Committee of the Advertising Association; and many other bodies.

Sir Francis was largely responsible for the formation of the B.C.G.A. Gas Salesmen's Circles in which he saw another means of increasing the Industry's service to its consumers. He was always a strong advocate of good service as the basis of all success in business, both individual and collective, and of mutual confidence as the bedrock for the relationship between a chief and his staff. He believed that the chief who had not the judgment to select the right men and the gift for getting the best out of them by confidence combined with watchful observation was not qualified for his own position. Though Sir Francis Goodenough had little time for other pursuits, he was particularly interested in travel and sport, while all who knew him, both within the Industry and outside it, appreciated his happy faculty of making friends wherever he went. The Gas Industry has lost a leading figure; but he has left a mark upon its history which time will not readily erase.

APPRECIATIONS.

From Mr. H. D. Madden.

(Chairman of the B.C.G.A. Executive Committee)

By the death of Sir Francis Goodenough the Gas Industry loses one of its most famous members and the writer an almost life-long friend. Although he has gone from our midst, the effect of his guiding hand will continue to influence the affairs of the Industry because of the far-reaching effects of his work. His successful career with his own Company was sufficient to be the life-work of most men, but in the midst of his strenuous work his great ideas visualized developments almost ahead of his time. He was deeply interested in commercial methods and the possibility of combining the whole of the Industry was one of his great visions. Out of his thoughts came the British Commercial Gas Association and its ramifications. How greatly that idea was necessary can be best evaluated to-day when salesmanship has permeated the Industry and enhanced its prosperity through many years.

He was not content to limit his conceptions even to the formation and success of that organization but took a vital interest in the personnel of the Gas Industry. The efficiency of the young men was a matter of deep concern to him and in order to promote their interests he spent a great deal of time in threshing out the Education Scheme which is at present the accepted standard of knowledge. Those who were associated with him when the difficulties of operating the Education Scheme were almost overwhelming will recollect with gratification his patience in endeavouring to satisfy the requirements of those whom he wished to assist.

Having successfully launched his Scheme of Technical Education, he then devoted his attention to salesmanship within the Industry, and it cannot be denied that the Scheme for which he was responsible has entirely altered the outlook of gas salesmen and made them appreciate the commercial aspect of their job.

The quiet and unobtrusive work done by Sir Francis on behalf of education was not spectacular, and a different aspect of his genius was shown when he organized the gas section of the Wembley Exhibition; here he proved as able as in other directions, producing an exhibit which held the attention not only of the Gas Industry but of the thousands of people who visited that great Exhibition.

It is impossible fully to appreciate all the work that Sir Francis carried out in his lifetime. His ability as a sales organizer was recognized when he was made President of the Incorporated Sales Managers' Association, and took as active a part in that capacity as he has done in his own Industry.

Words are inadequate to express my appreciation of his life and work. Not only has the Gas Industry as a whole felt his beneficial influence, but there are hundreds of young men in the past, and many more in the future, who owe to him a debt of gratitude. This not only applies to the Gas Industry but in whatever direction he set his hand. Whether directly or not I am sure that there are very few who have not been influenced by his example and benefited by his work.

From Mr. A. W. Smith.

(General Manager and Secretary of the Birmingham Gas Department.)

The news of the death of Sir Francis Goodenough will not have been entirely unexpected, and while bringing a measure of sadness to his many friends, this sadness will be to a large extent relieved by the knowledge that his long and painful illness—hopeless from the first—is at last ended.

The heartfelt sympathy of his many friends in the Gas Industry will, I know, go out to Lady Goodenough, whose delightful companionship and devotion Sir Francis so frequently extolled.

The debt which the Gas Industry owes to him is well-known to the older generation, but it is perhaps opportune to recall the heterogeneous and parochial condition of the Industry before he had the inspiration to suggest and the pertinacity to form the British Commercial Gas Association.

Apart from the very valuable work of co-operative advertising, of which the Association was the pioneer in this country, the improvement in the general service policy of gas undertakings has been due to his work more than to that of any other individual. The founding of the Association also made more easily possible the formation of the National Gas Council, the Joint Industrial Council, and the many other bodies which have helped to make the Gas Industry more homogeneous and co-operative.

Sir Francis was a man of rare vision and large ideas—sometimes considered extravagant, but always with the object of making more important and more useful the Industry in which he spent his life. His work for salesmen—not only those in the Gas Industry, but of all industries in the country—will long be remembered, and it was a great tragedy that at a time when he might have had a period of happy retirement to look forward to, he was overtaken by serious illness.

I shall always have the happiest recollections of our friendship. He was a many-sided man and an omnivorous reader; and whether on the golf links or discussing the latest best seller, or considering new ideas for making the Gas Industry, of which he was so proud, more efficient, it was a delight to be in his company.

From Mr. John Terrace.

(Chairman of the Institution Gas Education Committee)

Of the many services to the Gas Industry by Sir Francis Goodenough, not the least was the inauguration and control for 15 years of the Education Scheme of the Institution of Gas Engineers. In June, 1913, at the Annual Meeting of the Institution he read a paper on "Creating an Outdoor Staff," in which he set forth his idea of the need of Educational Reform, and no doubt used influence, in his characteristic way, to engineer the discussion on "The Education of the Gas Engineer" at the Meeting of the Institution in 1919 opened by Professor A. Smithells, who made a strong appeal for greater use of the Universities for scientific training of those entering the Gas Industry. While agreeing with such advantages, following speakers stressed the point that this was not available for the major proportion of the class from which recruits would be drawn, and a Committee was appointed with F. W. Goodenough as Chairman. Consultations took place with the Board of Education and the City and Guilds of London Institute.

Goodenough always insisted that the scheme should be one of education as distinct from examination only, and that it should cover all classes of those engaged in the Industry. This is not the place in which to give in detail the difficulties with which the Committee had to contend, but they were numerous. Nevertheless with a Chairman having such a thorough grasp of the problem, such force of character, great patience in dealing with discussions in Committee and a wonderful manner in arriving at a compromise, the Scheme was ready for submission, and was approved at a Special Meeting of the Institution in February, 1923. Since then its work has been one of steady progress though not without many modifications and developments, so when Sir Francis two years ago found it impossible on account of illness to carry on as Chairman, he left behind an organization worthy of the work it is designed to meet. Last year the examinations in the Major Courses of Gas Engineering, Manufacture and Distribution, were taken by 470 students, and in Gas Fitting by 2,139.

Besides the provision of facilities for technical training, Sir Francis was greatly interested in education for trade and commerce, and as one might expect, in salesmanship also, for it is as an exponent of salesmanship and his fine record in the creation and running of the British Commercial Gas Association that he will be mostly remembered.

As one who worked in close collaboration with him for many years, I bear tribute to his sterling qualities and ungrudging labours for the good of the Gas Industry in whose interests he was so proud to serve.

From "W.M.M."

The passing of my old Chief—"Big Chief" in every sense of the word—brings a rush of memories to one who probably was most closely associated with him in our early, strenuous efforts to put the B.C.G.A. on its feet safely and surely.

The Organization had to be built on sure and sound foundations, the very necessity and basis of its formation and development had to be thought out on practical lines, and its whole machinery, individual, district, and national, brought into being.

A century-old Industry, strongly entrenched in successful public

service, had to be convinced of and converted to the very modern business of advertising its wares—a process that was, naturally, repugnant to many stalwarts who had built up a solid, good dividend-paying, and apparently indispensable business. It is easy now to see and appreciate the value and absolute necessity for publicity and salesmanship, but in those early days the task seemed a colossal enterprise. Its steady and successful accomplishment was only made possible by brilliant and great conception, allied to persistent and convincing endeavour in securing an Industry's support—backed by necessary funds which began with something like a 10% contribution, and achieved, in its comparatively short existence, a practically 100% backing. That the Gas Industry was the first to combine nationally for publicity, and was afterwards followed by many others, bore excellent testimony to the wisdom and ability with which the scheme had been developed, and testified to the fact that such a bulwark of defence against increasing competition had ever been conceived.

The man who, without question, was the mainspring and unceasing inspiration for such results, bearing testimony as they do, to ceaseless effort and driving power over the whole period of his sustained Chairmanship, was undoubtedly "F. W. G." All who were associated with him on the Executive, many of whom live to see the fruits of it in their own undertakings, will assuredly endorse this.

A glance at the files of the "JOURNAL" published during the early days of the B.C.G.A., with reports of endless meetings and conferences, district and national, with records of the numberless schemes inside, as well as displayed advertisements; with the endless "files" of newspaper and journal "inspired" propaganda, would be an interesting study for some of those who have inherited the achievements of the earlier pioneers, the leader of whom, to those who knew and were associated with him, will ever be the man who was loved and followed as "The Chief," and who, his abilities and successes publicly recognized, finished his career bringing well-deserved honour to the whole Gas Industry, as Sir Francis Goodenough, C.B.E.

Letters to the Editor

Gas for Motor Transport

SIR,—I have just had an opportunity of reading the remarks of Mr. C. A. Masterman, of the Gas Light and Coke Company, in the discussion reported in your issue of Jan. 3 on the Paper given by J. Ivon Graham and G. J. Skinner before the Institute of Fuel on Dec. 15.

As you indicated in your editorial columns, it is regrettable that this type of criticism should come from a member of the Gas Industry.

Mr. Masterman states that petrol in its country of origin can be produced at a very low cost, and he then asks whether it is worth while employing compressed gas derived from coal for a purpose for which the imported fuel is peculiarly suitable.

I would remind him that similar arguments might have been used some ten years ago with regard to the application of fuel oil for industrial heating purposes. It might then have been argued that owing to the low cost of this particular form of fuel, the use of a more refined fuel in the form of town gas—the production of which might involve considerable capital expenditure—would be unjustified, whereas the results of research and scientific investigation have led to the displacement of large quantities of fuel oil in the many and varied industrial processes for which town gas is now employed, and I suggest that any capital expenditure which may have been incurred in the processing of coal for the production of gas for these purposes has been fully justified.

The extent to which the coal resources of this country should be employed to displace imported fuel must surely be decided by such questions as purchasing power and the trade balance between exports and imports; and while I have never heard it suggested by any "enthusiasts" that it would be economic to displace by home produced fuel the *whole* of the fuel which is at present imported, there is surely little doubt that the extended use of indigenous products would materially assist in the re-establishment of a more favourable trade balance with the consequent improvement in the rate of exchange.

The use of compressed gas, whether in the form of town gas, methane produced from town gas, or methane from other sources, may be looked upon either as a war expedient or as a peace time development. As a war expedient, the main object would be to replace liquid fuels required for other purposes, and, of course, to release shipping at present engaged for importing fuel. As a peace time development, the question should be considered with the objective of enabling this country to make the best possible use of home produced fuel, and to avoid the waste of a certain amount of methane produced from either sewage disposal works or other sources.

From results of experiments carried out during the last few years, it would appear that in the case of certain forms of transport there are possibilities both as a war time expedient and a peace time utilization, but whatever form the development may ultimately take it is necessary to point out that it will be but gradual in view of the time required for the installation of the necessary compressing and other plant, and the equipment of vehicles to operate on this form of fuel.

Such a development would, in itself, constitute a new industry; one which would not only result in the *gradual* extension of gas manufacturing plant—with a corresponding increase in the amount of coal required—but would also in time create employment for a large amount of labour in connexion with coal transport, gas production, production of steel for supplying the necessary containers, and also for the provision of compressing plant with its ancillary gear.

It should, I think, be clear that the economics of such a scheme would not be merely dependent upon the thermal costs of liquid fuel as compared with gas, but rather on the ultimate effect that such an increase in the use of indigenous products would have on the economic stability of this country.

Yours, &c.
A. W. SMITH,
General Manager and Secretary.

Jan. 9, 1940.
Birmingham Gas Department.

[The above letter reached us just too late for publication in our issue last week.—Ed. "G.J."]

SIR,—However to be regretted, it remains true that after nearly ten years of investigation and development work the use of compressed gas for motor vehicles is negligible, even in the case of local authorities owning both transport and gas undertakings. Will Colonel Carr explain this fact as due to gross lack of enterprise by the Gas Industry or to the existence of real difficulties? Because I suggested the latter he writes in your "JOURNAL" attributing to me an anxiety "to deprecate the use of gas."

We should surely recognize not only the merits but any possible demerits of this substitute for petrol before and not after tens of millions of pounds have been spent on the supply of the compressors and equipment necessary even for the displacement of only 10% of petrol used.

Most engineers, I think, would prefer my estimate of 6d. per therm minimum to Colonel Carr's 3d. to 4d. as an economic price for gas made under war conditions and involving the laying down of plant and mains at war prices such as substantial national substitution of gas for petrol would require. My estimate for garage and service charge of between 4½d. and 6½d. per equivalent gallon compressed gas cannot be seriously in error, as Colonel Carr suggests, in that for the simpler technique of petrol filling the present margin is, I understand, 3½d. per gallon.

Colonel Carr desires acceptance of about 1 therm of gas as the equivalent of 1 gallon of petrol, in place of the more usual figure of 1¼ therms. In the full sense of the word "equivalent," responsible transport operators in general appear unprepared to accept either figure. They emphasize the convenience value of liquid fuel as greatly superior to compressed gas and the disturbance to running schedules and payloads, which they associate with the use of compressed gas, as financially much more important than possible fuel economies. Do we know the price advantage at which the user will feel himself compensated for what he alleges are the disadvantages of gas against petrol?

Petrol pre-war was landed at prime cost at about 4½d. per gallon, a level towards which it will presumably return post-war. Every gallon sold paid 8d. tax to national revenue. Compressed gas untaxed did not generally prove an acceptable competitor. Why?

Cost changes due to the war may favour home-produced fuels, but if the advantage of use of compressed gas is largely in terms of a war expedient the more seriously must we consider whether the nation can, during this emergency, afford a vast engineering effort in the production of the compressors and equipment.

Some aspects of the difficult question of national interest in relation to home-produced fuels in times of peace and war are discussed in the 1938 Report to the Committee of Imperial Defence "Sub-Committee on Oil from Coal" (Cmd.5665).

Among a variety of considerations attention is drawn to the capital cost of hydrogenation plant as representing many times the cost of tankers for equivalent petrol shipment. The capital associated with the use of compressed gas is several times that required for hydrogenation of equal output.

In personal explanation, may I stress I am among the last to disregard or condemn new opportunity for the utilization of gas. I have been anxious for years to see transport operators or Gas Industry technologists find a way through the difficulties which have so long held back general acceptance of compressed gas as a motor fuel. But if, as an Industry, we pretend the difficulties are non-existent, those who understand our problem will despise our ignorance while the less-informed public will condemn our inertia over a development we have persuaded them is flawless.

How the future may be influenced by Erren engines, increased calorific value, or other developments, we cannot be sure. In that sense I intended no "attack on the commercial possibilities of the use of compressed gas for motor transport." But even at the risk of Colonel Carr's displeasure I make no apology for trying to introduce an overdue sense of reality when we are considering petrol substitutes for use in the present emergency and some restraint in our public promises for the yet uncertain future.

Yours, &c.,

Gas Light and Coke Company, Watson House, S.W.6.
Jan. 15, 1940.

C. A. MASTERMAN,
Chief Technical Officer.

Profits in the Coal Industry

SIR,—In his interesting article in your issue of Jan. 3, Dr. Foxwell quotes the figures for profits in the coal mining industry up to 1935 from my book "The Coal Problem." He adds: "What is the profit per ton to-day, the writer does not know, but in the light of the vast increases, amounting often to 6s. up to 12s. a ton for certain industrial coals, it must be very considerable."

Here are the figures since 1935:

		s. d.
1936:	Credit	0 11½ per ton.
1937:	„	1 2¾ „ „
1938:	„	1 4 „ „

These, and the figures up to 1935 quoted by Dr. Foxwell, are not a true profit. As pointed out at the head of the table from which the latter are taken, 3d. per ton must be deducted for charges which are inadmissible in the ascertainments.

Your readers may be interested to know that in bringing these figures up to date I took out the profits for the ten years 1928-1937, and was surprised to find that the average "credit" for this period was 4½d. per ton. Deducting the 3d. per ton this gives a profit of 1½d. per ton of coal sold for ten years.

The substantial increases in price referred to are easily explained. Owing to the lack of organization in the industry, buyers were able to "play off" one colliery against another and thus buy coal at uneconomic prices. This was stopped by Parliament in order to give miners higher wages and owners a fair return on capital. The 1938 figure for profit shows that the powers given to the coal owners have not been used to exploit the consumer, for it is less than the 1913 figure expressed in terms of money and much lower in real value than the pre-1914 figure of 1s. per ton, generally regarded as a fair profit in this industry.

May I add that one of the most surprising features of this industry is that prominent business men in other industries should regard its profits as being something mysterious. So far from this being the case, coal mining is subject to a greater amount of regulation and supervision involving publicity than almost any other. Its accounts are checked by independent accountants acting for owners and miners, and detailed statements showing output, costs, credits, &c., are issued regularly by the Mines Department. Copies of these can be obtained (in normal times) for each quarter and for each year from H.M. Stationery Office for 1d.

Yours, &c.,

J. P. DICKIE,
Author of "The Coal Problem."

15, Pollards Hill, London, S.W.16.
Jan. 12, 1940.

National Gas Council

Meeting of Central Executive Board

A meeting of the Central Executive Board of the National Gas Council was held at Gas Industry House, Grosvenor Place, London, S.W.1, on Tuesday, Jan. 9, 1940, at 11 a.m. Sir DAVID MILNE-WATSON, Bart, LL.D., D.L., presided.

It was reported that the British Commercial Gas Association had elected Alderman E. Grimsley, J.P., Chairman of the Leicester Corporation Gas Department and President of the British Commercial Gas Association as a Member of the Board.

Defence (Gas Charges) Order, 1939.—The Chairman reported steps which he had taken to bring to the attention of the Board of Trade the difficulties of Gas Undertakings which were not covered by this Order.

Price of Coal.—Assurances have been received by the Council that during the war there will be no increase in the general level of prices except after discussion and agreement with the Mines Department.

Committees of Investigation and Central Appeal Tribunal.—The Council has been advised that as the coal industry is now acting under the direction of the Government with regard to the supply and sale of coal, the Committees of Investigation and Central Appeal Tribunal will, therefore, no longer function. Complaints of consumers may be represented to the Central Price Regulation Committee set up under the Prices of Goods Act. This matter is being referred to the Conjoint Conference of Public Utility Associations for their consideration.

Coal Supplies.—The Board considered the position of coal supplies to gas undertakings, and the officers were instructed to take up this question with the Mines Department involving, as it did, the coke and other questions.

Railway (Demurrage Charges) Order, 1939.—Reference was made to the communication sent to Members of the Council with regard to this matter, and the officers reported the steps which they had taken to bring to the notice of the authorities the impossibility of gas undertakings in many instances complying with the terms of the Order.

Coke.—The communication from the Mines Department addressed to the National Federation of Gas Coke Associations dated Dec. 15 last authorizing increases over pre-war coke prices in various parts of the country was reported.

The Control of Sulphuric Acid (No. 1) Order, 1939, dated Dec. 16, 1939, was reported. Under this Order production, consumption, and disposal of sulphuric acid is controlled by means of licences.

Consideration was given to the following points:

(a) Where the production, consumption or disposal of sulphuric acid is any quantity not exceeding 5 tons in any calendar year.

(b) Where the sulphuric acid is consumed in the person's own works, if the purpose for which it is required and the quantity so used does not exceed in any year the quantity used during a period defined as the basic period.

Forthcoming Meetings.—It was decided that the twenty-second annual general meeting of the National Gas Council should be held in London on Wednesday, June 5, 1940.

It was decided that the next meeting of the Board should be held on Tuesday, Feb. 13, 1940.

Further Price Increases

In addition to the increases in the price of gas by various undertakings, referred to already in these columns, the undermentioned advances have also been announced:

Bo'ness.—By 5d. to 4s. 7d. per 1,000 cu.ft.
Burntisland.—By 7d. per 1,000 cu.ft.
Denny and Dunipace.—By 5d. per 1,000 cu.ft. in Bonnybridge area and by 7½d. per thousand in remainder of district.
Monifieth.—By 6d. per 1,000 cu.ft.
Newton-le-Willows.—By 1.8d. per therm or 8d. per 1,000 cu.ft.
Oakham.—To 1s. 3d. per therm (from 1s. 1.8d.).

News of the Week

Several Enquiries have been received by the Kettering Gas Company as to their supplying gas for motor vehicles, as they did during the last war. Arrangements are being made for this to be done.

By Collection Last Year employees of the Leicester Corporation Gas Committee raised £691 for the Royal Infirmary (£50 being allocated to the Children's Hospital), £82 for the District Nursing Association, and £40 for Dr. Barnardo's Homes. Up to the present time Leicester gas employees have contributed over £13,243 to the Infirmary.

On Emergency Street Lighting the Westminster City Council have been asked to approve expenditure up to £6,500. As is well-known, a considerable proportion of the street lighting in Westminster is by gas, and this expenditure evidently foreshadows the conversion of a large number of gas lamps to conform to the new low-intensity lighting specifications.

A Conference of Tyneside authorities interested in the proposed Bill of the Newcastle-upon-Tyne and Gateshead Gas Company for the purpose of acquiring the Morpeth Gas Company and erecting a gasholder at Gosforth and other matters has been held at Newcastle. It was resolved to obtain an expert's opinion on the Bill, and also to appoint a Committee of seven to consider all matters referring to the Bill.

A Meeting of the Institute of Fuel will be held on Jan. 25 at the Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, at 2.15 p.m., when a Paper will be presented by Messrs. N. L. Hudson, R. J. Bressey, and T. C. Bailey entitled "Pool Grades of Gas, Diesel, and Fuel Oils and their efficient Utilization in Oil-Burning Installations," to be followed by a discussion. Mr. Isaac Lubbock will be in the Chair.

It is the Intention of the Altrincham Gas Company to apply to the Board of Trade for an Order under Section I of the Gas Undertakings Act, 1929, for the purpose of authorizing the Company to borrow on mortgage of their Undertaking or by the creation and issue of debenture stock. The Order also seeks to modify the provisions of other of the Company's previous Acts and Orders in order to give full effect to the proposed Order.

Were it Not For the War it is likely that the number of consumers of gas in Britain and Ireland would now exceed 12 million. Statistics for 1938-39 compiled by the Industry show that consumers totalled 11,997,447, an increase over the previous year of 220,156. How the war has affected the total consumption of gas is not yet known. Between 8 million and 9 million gas cookers cook Britain's meals. Over 100,000 refrigerators are in every-day use. And more than 800,000 of our 1,300,000 street lamps are lighted (or were lighted, before the blackout) by gas. Figures also show that gas is now used by more than 4,000 British trades—for an average of 7 different processes in each trade.

For the Next Financial Year only £12,000 is earmarked for public gas lamps in Belfast as against £69 000 for the current year. The blackout is, of course, responsible for the decrease.

The 42nd Annual General Meeting of the Gas Companies' Protection Association will be held at Caxton Hall, Westminster, S.W.1, on Jan 23, at 2.30 p.m., and will be followed by a meeting of the Committee.

At the Outbreak of War Mr. W. Buchanan-Taylor and Mr. S. C. Leslie (Publicity Manager to the Gas Light and Coke Company) assumed the positions of Hon. Publicity Advisers to the National Savings Committee. By their advice a special section was created to deal with the editorial services of the present campaign, and Mr. Collin Brooks, M.C., was invited to take charge of its operations as Editorial Director. An office has been opened in Fleet Street, Benn Brothers, Ltd., having placed rooms, rent-free, at the Committee's disposal. The Committee will endeavour to provide constant news of the progress of the Savings Movement by supplying background facts and special statistical information on those financial aspects of the war with which they are in touch.

An Interesting Event took place at Newcastle on Jan. 11, when Mr. Thomas Ramsay, of Shields and Ramsay, Ltd., of Glasgow, was entertained to a Complimentary Lunch, given in his honour by the members of the British Creosote Company. During the proceedings, Mr. Stanley Sadler, Chairman of the Company, presented to Mr. Ramsay on behalf of the members a Silver Loving Cup, to mark his 30 years' unbroken association. The British Creosote Company was formed in 1909. The Cup bore the inscription—"Presented to Thomas Ramsay, Esq., by the Members of the British Creosote Company, as a token of their affection and esteem, on the 30th Anniversary of the foundation of that Company, 1909-1939." Incidentally, last year marked the Jubilee of Mr. Ramsay's firm.

Uneconomic Competition between the Bradford Gas and Electricity Departments is strongly criticized in a report issued by the City Council Economy Committee. Pointing out that as ratepayers are, in general, compelled to use one or both of the services, the report says competition is unnecessary and leads to practices that are wasteful and unsound. Advice given by the Committee includes: The system of simple hire should cease (because, the report alleges, both Departments have intimated that this system results in a loss); the two sales departments should be run as a joint concern under a Manager and staff who would have no interest beyond effecting sales. Publicity and showrooms costing £12,400 a year in the two departments are uncalled for and can be reduced considerably. (All applications for service should be made in writing to the sales department and no commissions should be paid); meter readers and inspectors should be trained to function for both departments; finally, as an incentive to the city's ratepayers, the Committee adds that the closing down of the showrooms would result in the saving of a 1½d. rate.

"I Pass This On To You"

Now, more than ever before, the 13,000 women members are in need of the help and companionship which they have derived from the Women's Gas Council in peace-time, and the Council is to be congratulated on the way in which it is maintaining this valuable service as well as extending its scope to cover the wide field of national service. Members of the various branches have found many directions in which to turn their energies to war work, and the spirit which animates their activities was fully evident at an At Home for women journalists held by the Council on Jan. 10 at Gas Industry House. Miss Wolseley-Lewis, Chairman of the Council, referring to the organization as a "big family," said that the plans for presenting a mobile canteen to the Forces had been enthusiastically received by all the branches and contributions were already coming in.

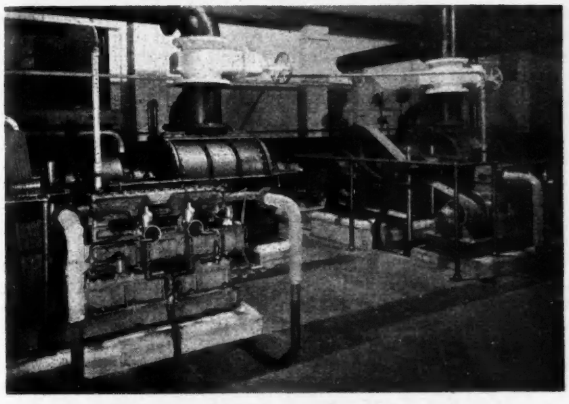
The At Home was given to introduce the new series of leaflets entitled "I Pass This On To You," which, as announced in our issue of Jan. 3, the Council is publishing. After Miss Halpin, who, as our readers will know, still has the activities of the W.G.C. very much at heart although she is engaged on war work with the W.V.S., had described the activities of the Council in war-time, Miss Wilson, Acting Organizing Secretary, introduced the new pamphlets. These are written by members who are engaged in national service work, and they will cover a wide field of subjects, including practical hints and tips for use in present conditions. The first of the series "Feeding 5,000" is produced in a most attractive style—lightly written and illustrated with amusing sketches by the well-known artist Harry Rountree. We described it, and the plans made for further publications, in more detail in our issue of Jan. 3. The series should serve a very useful purpose, and thus in spite of the war and its consequent upheaval the excellent work of the Council goes on from strength to strength.

Southampton's Up-to-date Gas-driven Boosting Plant

Our illustration shows an addition to the boosting plant at the works of the Southampton Gaslight and Coke Company. It is an example of one of the latest developments of Parsons Engineering Co., Ltd., of Southampton.

The engines shown are Parsons 6-cylinder units, developing 44 b.h.p. at approximately 1,200 r.p.m., mounted on steel bedplates and provided with a well-supported rope pulley at the flywheel end. The gas engines are driving Holmes-Connersville boosters used for augmenting the supply during peak hours.

These engines are particularly suited to this service; in the first place, being multi-cylinder vertical units, they are very smooth in operation and set up no vibration; also they are compact and occupy very little room indeed for their h.p. This latter feature



is valuable in connexion with plant of this sort which is not in continual use, as it enables provision to be made for the maintenance of a steady gas supply with the sacrifice of a minimum amount of floor space.

Being completely self-contained and force-lubricated, the engines require practically no attention while running, and the special nature of the gas mixing valves, together with the steady pull of the induction, obviates the necessity for a gas bag. The usual gas governor on the main supply to the engines is all that is required.

The engines start instantly by hand and are provided with magneto ignition with impulse drive.

Canadian Gas Association Directory of Approved Appliances

The latest issue of the Canadian Gas Association Directory of Approved Gas Appliances and Listed Accessories is being mailed to almost 1,000 names on the Association's mailing lists all over Canada, including gas companies, commissions, members of the Association, plumbers, heating contractors, dealers and merchants of gas appliances, and many others interested directly and indirectly in the Gas Industry.

This Directory is becoming of increasing importance to all those responsible for the purchase and sale of gas appliances that bear the seal of approval or listing of the Association's Laboratory Approval Division. Over 20 manufacturers' appliances are registered in the Directory, and the total number of individual appliances and accessories listed exceed 150.

The Association state that had it not been for the introduction of approved gas appliances by many gas companies throughout Canada during the past few years, the Industry would have become of secondary importance in the eyes of the public generally. As it is they have been able to hold their own against all comers, and the future is bright for much increased business. It behoves every gas utility, they observe, to insist on approved gas appliances; for in doing so they hold the business already in hand, and bring back to the fold many who had changed over to competitive fuels. Shoddy or cheaply constructed domestic gas appliances, or appliances that cannot meet the tests prescribed by the Laboratory Requirements Committees, spell eventual death to the Gas Industry, and should not be bought or sold by gas undertakings that are looking for increased sales of gas. We, as an Industry, cannot afford to allow anything to be introduced into a customer's home that eventually means poor advertising for our business.

Wages During Illness

In reserved judgment delivered at the Liverpool County Court last week Judge Procter decided that a Liverpool gas fitter was not entitled to be paid wages during illness.

The plaintiff was John Nelson Fitzgerald, a gas fitter of Tiber Street, Liverpool, who sued his former employers, the Liverpool Gas Company, for £270 arrears of wages for 21¼ months during which period he did not work because of illness.

In his judgment Judge Procter said in the 10 years from Aug. 9, 1927, to Aug. 6, 1937, the plaintiff was absent through illness on an extraordinary number of occasions. He was never paid wages for any time when he was absent by reason of sickness. Fitzgerald never asked for wages after he ceased work on July 20, 1937, until shortly before he launched his claim. He had admitted that the first time he ever thought of claiming wages for the time he was off work through sickness was when he heard of a case which had been decided by the Court of Appeal. That was obviously the case of Morrison v. Bell.

"Fitzgerald could not in my view of the facts have failed to be aware of the custom in the Gas Trade that men working on hourly rates are not paid when off work through sickness, and to have known at all material times that it applied to his service with the defendants and that he was contracting with the defendants on the basis of the custom," declared Judge Procter. "In fact, at all times prior to the putting forward of his claim in this action he acted upon the custom. The plaintiff's claim appears to me to have been based upon a misunderstanding of the affect of the decision of the Court of Appeal in Morrison v. Bell. After careful consideration of all the facts I give judgment for the defendants with costs."

Mr. Glynn Blackledge, who appeared for the Gas Company, said his clients quite naturally felt that was a claim which perhaps ought not to have been brought, but on the other hand they felt that there were many people who misunderstood the case of Morrison and Bell. That had now been cleared up and in those circumstances the defendants did not wish to press for costs.

Supply Ministry's Functions

Colonel J. J. Llewellin, Parliamentary Secretary of the Ministry of Supply, met a party of Press representatives in London on Jan. 12 to explain the work of the Ministry, with special reference to bulk purchases of raw materials for war purposes and to control and salvage schemes designed to supplement raw material supplies and make the best use of them. Contrasting the position to-day with that in the early months of the last war, he pointed out that the Empire production of copper had risen from 85,000 tons per annum in 1914 to 600,000 tons to-day; lead ore from 130,000 tons to 630,000 tons; nickel from 20,000 tons to 95,000 tons; aluminium from 13,900 tons to 80,000 tons, and asbestos from 98,000 tons to 344,000 tons. The first controller in the last war was not appointed until December, 1915, and iron and steel was not completely controlled until October, 1916, with the result that prices of raw materials soared, shortages developed and public administration was at the mercy of the market, and a number of people who had stocks, when they saw that prices were rising, held their stocks to get yet higher and higher prices.

In connexion with the present war the whole control organization was ready to be put into operation contemporaneously with the outbreak of war, and orders with regard to iron and steel and other materials were actually made two days before the war started. The steel making capacity of this country was increased by 75% between 1914 and 1940, and in the Empire overseas production had grown from one million to four million tons a year. Taking the whole of the British Empire the steel output had increased from nine million to 18¼ million tons.

In short, the functions of the raw materials department of the Ministry of Supply were to see that the stocks essential for our war effort were maintained; to buy such stocks at the best prices obtainable; to avoid violent fluctuations in price which would be bound to occur if they had no control and to sell goods at prices that on the one hand would avoid loss to the taxpayer and on the other hand were fair to the consumer; to ensure that stocks were distributed in such a way as to secure their use for the things most essential to the winning of the war, supplying the needs of both fighting forces and export trade.

Answering questions, Colonel Llewellin said the Ministry aimed at fair distribution of the available raw materials on the basis of essential needs. In the case of local authorities it was necessary to differentiate between the luxuries of a new town hall and the safeguarding of public health in regard to such matters as urgent drainage work. The requirements of the smaller firms, provided they were for essential purposes, would be treated with the same consideration as those of the larger firms. Generally speaking it was the larger firms who handled the greater share of the export trade, but if the smaller firms were doing the same things they would receive the same treatment.

Non-Aerated Burners—Research and Practice

By
DEAN CHANDLER, South Metropolitan Gas Company

THE present is an opportune time once more to draw attention to the possibility and desirability of extending the use of non-aerated burners in gas appliances, as Institution Communication No. 223, which was to have been presented to the Research Meeting planned for November last, again emphasizes the limitations of the bunsen flame in view of the difficulties of "firing back," "blowing off," and "luminous flame." Then, a great deal of experimental work has been done on the design and construction of Aeration Test Burners and these burners have been used in lengthy investigations into the combustion characteristics of gases of different compositions. The conclusion seems to be that the manufacturing side must keep within a small range of A.T.B. numbers, if variation in the composition of the gas is not to have undesirable results in practice.

The suggestion in a recent Communication that both gas and air regulators may be necessary on bunsen burners would appear to suggest that to supply gas of such reasonably constant combustion characteristics as are required by modern conditions of gas utilization may, in itself, be an onerous business. Entirely without the doubtful aid of such awkward devices—the lay public does not understand gas and air regulators—the non-aerated burner gives a flame of inherently greater flexibility than the bunsen flame. Indeed, the need for some flexibility in gas quality to enable manufacture to be carried out on economical lines would be met by the use of the more flexible, non-aerated burner. Attention may also be directed to the statement of Professor Townend in Communication No. 221 that some of the difficulties associated with combustion of gas may disappear with the increasing use of non-aerated flames.

It seems logical, too, that during the present lull in appliance sales special attention should be directed to possible changes of design in appliances in preparation for more settled times. There is a growing tendency to revert to non-aerated burners in gas-burning apparatus and it would now be advantageous to devote experimental work to the design of appliances intended, from the start, to embody such burners. Experience proves that the best results are obtained by such measures, although in the course of experiment it has become clear that some existing types may be simply and satisfactorily modified for the use of non-aerated burners. To suggest that the use of non-aerated burners would eliminate the necessity for experimental work would be misleading. Investigation would have to be made to determine the proper conditions for the use of such burners, but it is suggested that the time and money spent on this work would be at least as profitable to the Gas Industry as the work which is now carried out to determine what, if any, is the practical value of A.T.B. numbers.

Among the advantages deriving from the use of non-aerated burners is the greater flame stability over a wide range of gas rates. This point is particularly important in the case of cooker ovens, as it makes possible higher oven efficiencies under thermostatic control, as the thermostat is enabled to control accurately and safely at lower gas rates than commercial bunsen burners can accommodate.

It has been said that non-aerated burners necessitate the use of a governor, but experience has shown that this is not an essential. Many cookers with non-aerated burners have given satisfactory service in South London with a choke to break down the pressure. The comparatively small variations in district pressure are then covered by the flexibility of the non-aerated burner and the effect of district pressure variation is less noticeable than with bunsen burners.

Water heater manufacturers have practically standardized non-aerated burners for very many years. Indeed, Maugham, who is generally credited with the invention of the gas-heated geyser, experimented with bunsen burners but went over to non-aerated burners as the best way of burning gas in a water heater. His experience was paralleled by that of other makers of similar appliances.

Some three years ago experimental work by the South Metropolitan Gas Company on the use of non-aerated burners in wash-coppers made possible the development of a flueless appliance in which an efficiency of about 70% is obtainable, and one firm alone has put out over 2,000 of this type of copper in the last two years.

Gas fires embodying non-aerated burners were put on the market a few years ago by Radiation Ltd., and their further developments of this idea are of special interest.

The South Metropolitan Gas Company produced an experimental hot-plate with non-aerated burners, but this has not been commercially developed. Eight-jet burner heads took the place of the large bunsen ring boiling burner with an improvement in efficiency. A cross on the top of the burner enabled small pots to be placed over the open burner. The burners to replace the bunsen simmering burners had 4-jet heads and also gave higher efficiencies than the aerated burners they replaced. As, however, the 8-jet burner could safely be turned down to give low simmering rates, the 4-jet head was abandoned and the larger burner was used instead to increase speed of boiling on all burners. When the 8-jet burner was used in conjunction with a bar hot-plate it had an efficiency some 25% greater than that of the replaced ring bunsen burner.

In the "JOURNAL" for Nov. 3, 1937, the South Metropolitan Gas Company published details of a new gas cooker using non-aerated burners in the oven. Several of these cookers have been in use in the homes of some of the Company's employees for two years or so and have given complete satisfaction. In the 1937 article it was mentioned that standard cookers had had the bunsen burners replaced by non-aerated burners for district test. This course was adopted to a certain extent to establish the suitability or otherwise of the actual jets in ordinary service. To obtain wider district experience members of the lay public buying modern cookers were asked to allow the special burners to be supplied instead of the customary bunsen burners. In the circumstances it may be assumed that they would be more than usually critical of results from a new appliance. Indeed, comment was particularly invited. With one or two exceptions not traceable to the oven burners, observations on experience have been very favourable. In this way the excellent qualities of the non-aerated burner for this work have been proved in about 50 households of all types. The converted restaurant cooker and the converted "New World" domestic cooker mentioned in the November, 1937, article have now been in use continuously for two years and three months and the burners are unharmed, and no maintenance service whatsoever has been required or given. Despite the success of this experiment with converted modern cookers, it is still considered desirable, as stressed earlier, to design from the start for non-aerated flames.

It has been argued against the use of non-aerated burners in cooking appliances that they would be too easily choked by liquids boiling over or by splashed fat. That they are less liable to this trouble than bunsen burners in the same circumstances has been established by actual trial. This result is, indeed, to be expected, if it is realized that the speed of the gas issuing from a small orifice in a geyser jet is greater than that of the air-gas mixture through a bunsen burner port, and resistance to blocking is therefore greater with the geyser jet.

While there is much to be said for the more general use of non-aerated burners in the domestic field, a good case can also be made for the extension of their use in industry. In South London, open hearth and muffle furnaces, salt bath furnaces, and soldering iron equipment with non-aerated burners have functioned satisfactorily in service.

In conclusion, it may be asked, "What special virtue has a bunsen burner to justify its use in those cases where obviously simpler and cheaper means can be employed to do the work with greater ease and at least equal efficiency?" The answer usually given is that the bunsen burner is a more scientific device for the efficient combustion of gas. Surely on any basis, whether practical or scientific, the superior arrangement is that which does the work most effectively and efficiently in the simplest possible way. The extended use of burners of the non-aerated type merits, and demands, the attention of the Gas Industry.

The Place of Coke in Utilizing Our National Fuel Resources

An Address by Mr. W. L. Boon, M.Inst.F., M.I.Mech.E., General Manager of the London and Counties Coke Association, given at a Meeting of the Members of the Fuel Luncheon Club on Wednesday, January 10

IT would be true to say that the Institute of Fuel since its inception has consistently focussed more attention on the question of the conservation of our national fuel resources than has any other body. The Presidential Addresses which we have been privileged to hear under its auspices have been from leaders of industry, men having widely separated interests and of unquestionable authority on the subjects with which they have dealt, and in one form or another they have all urged upon us the need for a rational and comprehensive policy in the use of our national fuel resources.

I may be permitted to quote as examples of this similarity of view and purpose but two paragraphs which are concise summaries of the position. One is from Lord Hirst's Presidential Address in 1931, and more recently from the late Sir Philip Dawson's Address in 1937. The former, in advocating the creation of a national body for the co-ordination of the fuel industries, said: "May I plead that in the interests of the coal industry and the nation, a really powerful organization be formed to undertake research and to deal authoritatively with all matters relating to the preparation of coal for the markets and its known uses and those yet to be discerned. An organization such as I visualize would raise the industry to a technical level hitherto not imagined."

The late Sir Philip Dawson was perhaps more emphatic in his advocacy of a national fuel policy and in his Address used these words: "We are at the beginning of an era which is to treat coal as a raw material of a manufacturing process and it is a matter of the greatest national importance calling for the advice of the highest authorities in each section of the industry. Only by one supreme central body can guidance be given which shall place the nation on the road which will produce the greatest benefit for all sections of the community and in order to co-ordinate the whole of the power and heating requirements of this country it is recommended that a new, permanent, control body be created by Act of Parliament."

And in years prior to the formation of the Institute of Fuel there was ample evidence that prominent men were concerned with this same subject and were advising the development of our fuel industries on those same lines; we have, for example, the Paper presented by the late Sir Arthur Duckham to the World Power Conference in 1928; its title, "A Fuel Policy" was concise, although it embraced comprehensive reforms which to some extent have been followed and developed within the coal industry.

Co-Ordinated Policy

Only a few weeks ago our Chairman, Colonel Bristow, was himself eloquent upon the same subject. For nine years, therefore, the Institute of Fuel has been the platform for a consistent advocacy of a co-ordinated national policy for fuel utilization, and it might seem almost a waste of time for me to stress the need at this time for such a rational development, for so much has already been said upon this subject. It is therefore disturbing to all who are closely concerned with the fuel industry in this country to realize that the Government are lethargic on this matter or have not apparently appreciated the fundamental importance of setting up machinery towards the establishment of co-ordinated development for the utilization of the Nation's fuel resources, which are, after all, the greatest national asset the country possesses.

It is indisputable that the rate at which we are using coal and oil is immeasurably greater than the rate at which these minerals were formed, so that we can expect that the problem of fuel conservation will become a more pressing one year by year. Notwithstanding that the country has been without the guidance of any formulated policy in regard to fuel use and development, much has actually been achieved in the direction of fuel conservation by private enterprise and economic pressure. The large fuel consuming industries, particularly, responded to the pressure of high coal prices which the last war engendered, and to that fact more than to any other cause can be attributed the impetus which was given towards increased efficiency in fuel utilization—a movement which has continued in most of our major industries once the advantages of fuel conservation had been proved. But while much has been done in our major industries very little has been achieved in regard to the small industrial consumer and in the domestic use of fuel which in the aggregate consumes the greatest quantity of coal sold in home markets. Coal is our only indigenous fuel and is a vital raw material for our industries, and its wasteful use cannot be condoned either on economic or on technical grounds.

Until quite recently the coal industry has not been interested in fuel conservation; in fact, it has felt aggrieved by the more effective methods of utilization which have been devised and/or used by the consumers of its products. The industry has been content to sell whatever quantity of coal it could, without concerning itself whether it was used wastefully or well. How the fuel was used was considered to be the affair of the consumer, and the major industries of this country have made it their affair, and, as events have shown, to good purpose. But what of the great mass of coal consumers? Who is looking at the question of fuel use and conservation on their behalf? Certainly not the coal industry, and certainly not the Government. In fact there is no conservation policy of any kind, and if the Government have had a policy it might be described as political and protective and only mildly constructive. It aims chiefly at protecting the coal industry from the depredations of foreign competition by taxing oil imports, by preferences on home-produced oil and motor spirit, and by subsidies and restriction of output, and latterly by price control.

No Formulated Scheme

Let us examine the various steps which the Government have taken in this direction. In 1916 they appointed the Coal Conservation Committee to advise on the recovery of by-products with a view to ensuring the greatest possible economy and the most advantageous use of coal. Among other recommendations of the committee was that of the formation of a separate Ministry of Mines. In 1917 the Fuel Research Board was appointed under the newly constituted Department of Scientific and Industrial Research. In their first Report this Board stated, *inter alia*, that there was a definite demand for a smokeless domestic fuel, brought about mainly by the growth of public and municipal opinion as to the grave evils due to atmospheric pollution caused by smoke emitted by industrial and domestic fires, and that the only development which would satisfy this demand was the replacement of a large proportion of the raw coal which is at present burned in boilers, furnaces, and domestic fires by manufactured fuels, prepared from raw coal, by submitting it to distillation, as in the gas and coke oven industries.

The Samuel Coal Commission was appointed in 1925 and also made similar recommendations, which in the opinion of the Commission might promote the use of more scientific and efficient methods of ultilization. As a result of these various commissions we have our Ministry of Mines, we have our Fuel Research Board, but we have never had any formulated policy either for the utilization or conservation of our fuel resources. It would appear that the problem has never been squarely faced by any department of the State, and that in spite of the colossal waste to which the coal resources of this country are being subjected nothing has been done to get at the root of the matter. Hitherto the coal industry had thrived on a growing demand and enormous waste by all consumers, and it is only since the higher prices engendered by the last war brought into being trained fuel technologists that a remarkable saving in fuel consumption in very many classes of industrial operation has been perceptible. In spite of the fact that industrial power has been more than trebled in the last twenty-five years and that the population has increased by more than 10,000,000 souls in that time, the present home consumption of coal is only about equal to that of 1895.

Economies Achieved

It is estimated, therefore, that between 25 and 30 million tons of coal are saved each year consequent upon the more efficient methods of utilization which have been developed by the consumers of fuel and the possible limits in this direction have by no means been reached. It is very evident I think, that the progress which has taken place during the past 25 years in solid fuel utilization has, in the main, been due to private industrial enterprise engendered by the need for economy, which has in turn stimulated the manufacturers of appliances to produce more efficient methods and plant in which coal can be used, than to any movement the Government has put into action for this purpose.

The cumulative effect has, nevertheless, been remarkable in the

degree of economy which has been achieved, but the movement has lacked co-ordination and has suffered because there has never been a guiding policy behind it, other than that exercised within specific industrial groups, such as the Fuel Economy Department of the Federation of British Industries, the Coke Associations, and, more recently, the Coal Utilization Council, whose work is, however, largely confined to the members of these groups. In whatever degree these various supported movements have taken place towards economy in fuel use, none of them, valuable as they have been, touch the fundamental issue of main policy, or get at the root of conserving the coal resources of this country. To put it quite simply, we accept the fact that for certain purposes the use of coal in its natural state is quite uneconomic, both to the individual and to the nation, yet we have no authoritative voice to prevent such obvious waste continuing. Take only the case of the domestic fire, which is responsible for the consumption of at least 25 million tons of coal each year in this country. The consumer buys his coal, if we take London prices, at, say, 55s. per ton, and obtains from it about 65 therms of useful heat. Through the processes of carbonization in the Gas Industry we obtain from a ton of coal 75 therms of gas, 145 therms of coke, 10 gallons of tar and 25 lb. of sulphate of ammonia, which at the London selling prices has a value to the community of something like £5, or nearly double that of the original coal. Apart from this economic factor is the important production of basic raw commodities which the carbonization of coal provides, and upon which many British industries now depend.

It would provide interesting statistics in support of our case if the value of British industries which rely largely for their raw materials upon the by-products of processed coal could be assessed. Benzole, dyes, synthetic resins, plastics, and a great variety of chemical compounds are but a few of the manufactured goods representing industries which have grown to important dimensions in the industrial and economic structure of this country. On the other hand, if we deprive our householder of his coal for his domestic grate, we must be prepared to give him a substitute which will be no less efficient as a heating medium and no more costly. Coke from both high and low temperature processes is already accepted as an efficient substitute for coal, and is rapidly establishing a market of important dimensions on its own merits as a domestic fuel. The change-over from coal to coke is only limited by the quantity of suitable coke which can be made available for this purpose, and as an indication of the potential possibilities in this direction, the increment of substitution which is taking place within the area of the London and Counties Coke Association alone represents 300,000 tons of fuel per annum. More than three million tons of coke is now used for essentially domestic purposes in the South of England, or, to be precise, within the area of the London and Counties Coke Association.

Conservation of Domestic Coal

If we take this quantity in conjunction with the gas which is also used for domestic purposes, it may be claimed that a material contribution towards the conservation of domestic coal has already been made and has been developed on the principle of efficiency in utilization with economic advantage both to the individual and to the State. If the use of solid fuel in the homes of the people in this country is to continue, and there is no indication that any material change in method or principle is probable, then it would seem logical to provide a solid fuel for this purpose, not less beneficial in any single individual effect than the coal they have been accustomed to use, but from which has been extracted the by-products which are so valuable to the community, but which the domestic consumer of raw coal cannot use and simply discharges into the atmosphere as a polluting agent.

If we recognize, as I think we must, that carbonized fuels can fulfil every domestic purpose for which coal is used, then there arises only one question—the adequacy of supply. At the present time about 6¼ million tons of coke of all classes is used for domestic purposes in this country (say, a quarter of the total coke production), but this is little more than a fifth of the total requirements of the domestic solid fuel market. It will be appreciated that the growth of the domestic *coke* market has taken place almost entirely in the last two decades, so that the position achieved in a relatively short period is somewhat remarkable, and substantially confirms the principle that carbonized fuels are acceptable to the domestic consumer in place of coal, and that the extension of the coke market is only limited by the quantity of suitable fuel available for its consumption.

If the domestic market can so readily absorb coke as a substitute fuel for coal, and if the economics of its utilization are so sound, why is it that its adoption cannot be accelerated? I think the answer lies as a major issue which could only be adequately solved by the formulation of a national policy. If we examine the position of the coke producing industries we find three non-co-ordinated interests:

1. The colliery coke oven industry, which produces coke as a primary product, but must find for its economic sufficiency a sale for its gas and by-products.
2. The Gas Industry which produces gas as its primary commodity but must effectively sell its coke and residuals as secondary products.
3. The low-temperature carbonization industry, which depends almost equally upon its production of domestic coke, diesel oil, and other liquid products.

The total coke producing capacity of the three industries has never been as high as it is at the present time, and if all plants in this country were in operation, coke production could be increased by 40% above the total production of last year, but this could only be done if the gas made by this added coke yield could be effectively absorbed. The extension of the use of carbonized fuels in this country does, therefore, largely depend upon an increased absorption of gas, and as the extended use of the two fuels is synonymous, with progress towards that more effective utilization of our fuel resources towards which we aim, there should be no obstacle to its development, rather should it be encouraged.

Of our total coal production nearly 40 million tons per annum is now being carbonized, or about one quarter of the total coal sold for home consumption, so that, while this represents an important contribution to fuel conservation, the process is not going fast enough. As a country we do not seem to have realized the signs of the times in the race for world commercial power, and particularly for the post-war period it now becomes more imperative to have constructive policy in the use of our basic fuel resources than at any time in our history.

Within the coke industry itself we have in some measure operated under co-operative action and we have experienced the benefits which are derived by co-ordination of both commercial and technical interests. If this policy can be so beneficial in a small way, surely it can be enlarged to a national scale with greater relative effect. There are those who will suggest that we are out of date to contemplate the use of any solid fuel for future domestic use in this country and that if we are to progress we must look forward to the days of having fuel on tap or switch. I think we all look forward to having such benefits at our command, but I am afraid that it is going to be a long time before the production of such fuels could permit of their being economic to the great majority of people in this country.

It does appear, therefore, that solid fuel is to remain with us for many generations as our main source of heat, but I think it is clear that the community is changing its view with regard to the type of solid fuel which it will use. I believe that the late Sir Philip Dawson was very right in his diagnosis and that we are facing a new era in which the carbonizing of fuel will play an increasingly large and important part, and I am glad to have had this opportunity of adding my small plea to those which have been made by the many eminent men within the Institute of Fuel who have advocated a national perspective on the use of our fuel resources; we should not allow even the present war situation to interrupt what is so vital a policy for this country. In fact, I believe that the conditions which have arisen in the war and those which will arise afterwards but add to the imperative need for this matter to be dealt with, and I hope that the Institute of Fuel will continue to use all the influence it can bring to bear to this end.

Replica of Myddelton Cup Presented to American Society of Civil Engineers

In September last it had been arranged that representatives of the Institution of Civil Engineers should visit the United States in response to an invitation from the American Society of Civil Engineers, but international unrest in Europe resulted in the cancellation of that visit.

Had the visit taken place, it was intended that Mr. W. J. E. Binnie, who was then President of the Institution, should present to the American Society of Civil Engineers a replica of the Myddelton Cup, as a token of the friendly relations which have ever existed between the two Societies. Lord Lothian (British Ambassador to the U.S.A.) has now, however, on behalf of the Institution, handed the replica to Colonel D. H. Sawyer, President of the American Society, at a gathering of the members of that Society held in Washington on Jan. 9.

The original Cup was presented to Sir Hugh Myddelton in 1613 by the Worshipful Company of Goldsmiths of London for his services in providing London with a supply of potable water. It remained in the possession of the Myddelton family until 1922, when it was acquired by the Goldsmiths' Company.

Lord Lothian has, by completing the ceremony of presentation, cemented the cordial feeling between the two Societies and strengthened that part of the bond of international friendship which is based upon the creative genius of the civil engineer in all parts of the world.

LUMINOUS FLAME FIRES

New Models by Radiation

During the last year or so two new types of gas fire developed by Radiation Limited have been tried out in different parts of the country. These fires are now being marketed, and the following description is taken from a brochure published by the firm.

OVER a period of years the Research Laboratories of Radiation Ltd. have devoted attention to the inter-relationship between the quality of radiant heat and the sensation of comfort experienced by individuals exposed to a fire. As a result of this work it is known that the sensation of comfort is greater when the radiant heat emitted contains an increased proportion of the more penetrative short infra-red energy, and it is recognized to be desirable to have, for radiant heating, either a source at a high temperature or a selective emittor which will give a high proportion of short infra-red energy.

Following this work, the conclusion was reached that radical modification in the design of appliances would be necessary to obtain fires which would be really more satisfactory. It was decided to adopt a construction consisting, in essence, of a single, brightly incandescent combustion chamber, uniformly heated so as to give a "full radiator" effect and mask details, covered in the front by an irregular screen of heavy structure through which the highly heated surface of the refractory should be viewed. The heating of these fires was to be effected by the use of luminous flames, which would ensure absolute silence, an effect never really attained in fires heated by bunsen flames.

The first fires embodying these conceptions were completed about eleven years ago. They were of the inset type with black cobbles, and were heated by luminous flames. Subsequently, the ideas were developed further in a hearth pattern fire. Many years' experience has confirmed the opinion that these fires provide the most satisfying gas-heated source of radiant energy yet available for the warming of a living room, and the development has introduced a completely new conception of gas fire design.

In considering the psychological appeal of the domestic fire, it has been found that there are two schools of thought—those of the first are of the opinion that if the fire is made up of brightly incandescent masses surrounded by, or intermingled with, relatively large black masses, a degree of restfulness is attainable which is not produced by other means. These features, which also are characteristic of the solid fuel fire, are present in one of the new fires, the "Solbeam." The second school of thought holds that what may be ideal for a solid fire is not, of necessity, ideal for a fire heated by gas, and objection is taken to the massing together of blackened cobbles as a screen for the front of the incandescent combustion chamber. It is argued that such a design is "old-fashioned" and suggests an imitation of something which is not particularly pleasing, namely, the solid fuel fire.

People holding this latter view have reacted favourably to a formal design, and a second type has been developed which embodies a series of parallel members, heavy in structure, to serve as the front refractory screen through which the combustion chamber is viewed. The resulting fire, which is called the "Silent Beam," is markedly different from the columnar radiant fire of the past. While still giving the "full radiator" effect and attaining complete silence due to the use of luminous flames, this latter fire has the additional advantage of emitting energy of higher penetrancy, approaching more nearly in quality that yielded by the Clinical Gas Lamp, which was designed originally for therapeutic purposes.

Domestic Heating by Radiant Heat

In this country, to enable comfort to be attained, it is necessary to provide in the home, for the greater part of the year, an artificial source of warmth. In considering the best way of ensuring the necessary temperature conditions in the environment, two general cases have to be distinguished.

(1) Where it is desired to render the whole apartment comfortably habitable throughout, and

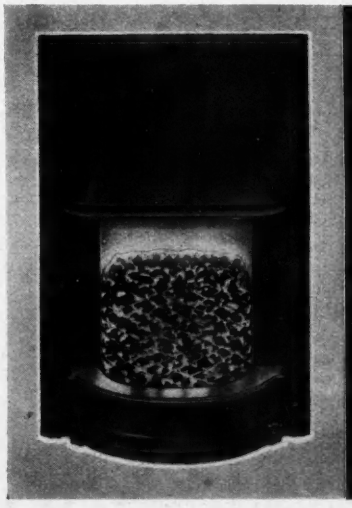
(2) Where it is desired to establish conditions of comfort for occupants in more or less fixed positions—e.g., near the hearth.

In the latter case especially, provided the air itself is not too cold, the use of radiant heat directed on to the occupant not only enables the most satisfactory conditions to be attained, but it is actually the most economical method of attaining the standard of comfort desired.

In ascertaining the conditions of maximum comfort, it is important also to consider the quality of the heat emitted by the fire. Radiant heat may have a stimulative effect, but the degree to which the human skin can be penetrated varies with the wave length of the radiant heat falling upon it, and in general the shorter the wave length, the greater the penetrancy of the energy. When the human body is exposed to the influence of radiation, a feeling of greater comfort is associated with the more penetrative forms of radiant heat.

While increase in penetrancy is desirable, it is essential that the source of heat must not produce a sensation of glare, and it is in the arrangements offered to avoid this effect, and to increase restfulness, that the "Silent Beam" and "Solbeam" fires represent such a departure in design.

The efficiency of utilization of the heat produced by the combustion of town gas in fires is an important factor in determining



The Original "Cobble Beam"

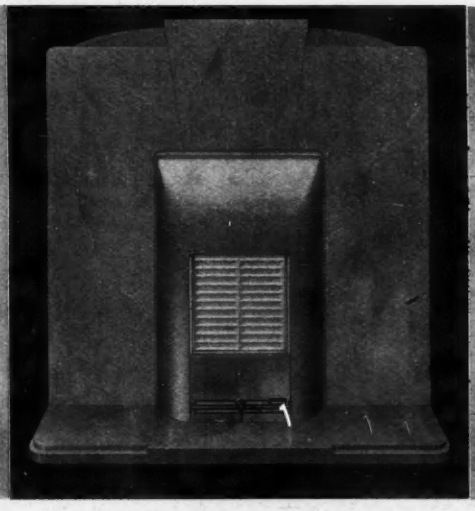


Fig. 2.—"Silent Beam" Fire.

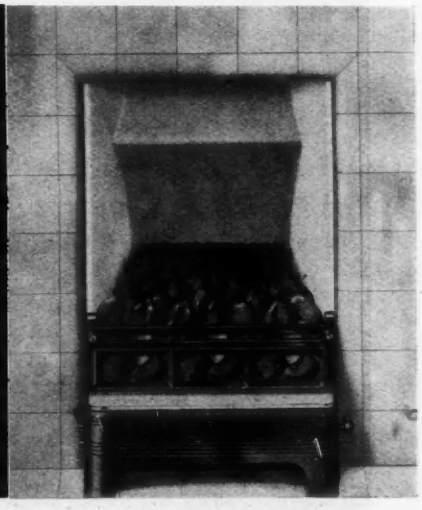
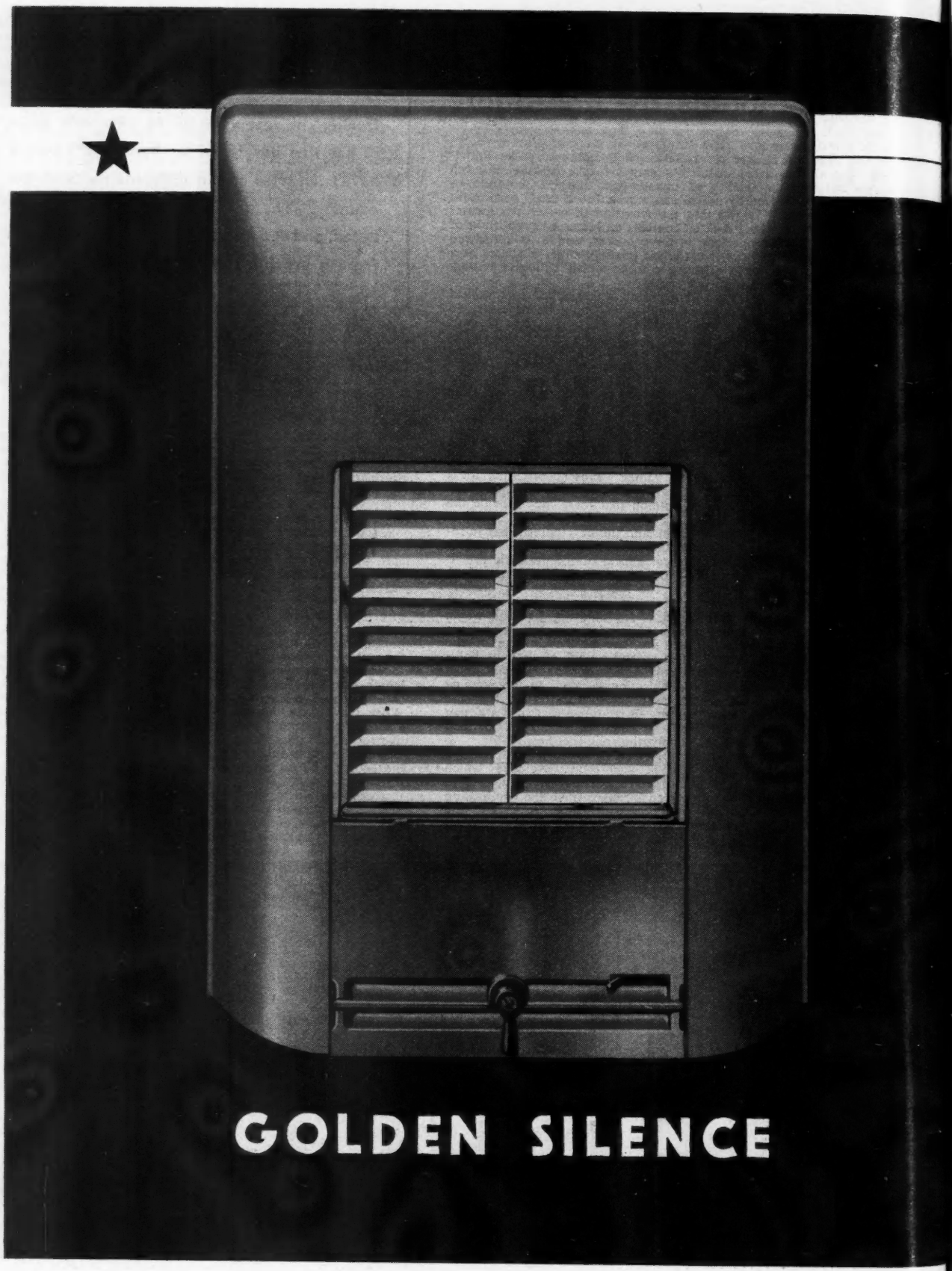


Fig. 7.—"Solbeam" Fire.


GOLDEN SILENCE

their adoption for domestic heating. Any improvement which can be effected in this respect increases the range of circumstances in which it is advantageous to use gas as the fuel. An examination of the flow of burning gases over the surface of solids and of the influence of air dilution on the transfer of heat to the scrubbing system has rendered it possible to devise means of extracting more effectively the sensible heat from combustion products, while still ensuring the satisfactory burning of the fuel.

The application of the knowledge attained has made it possible to simplify the design of heat transfer systems, and, without sacrifice of effective radiant efficiency, to ensure the emission of highly penetrative energy.

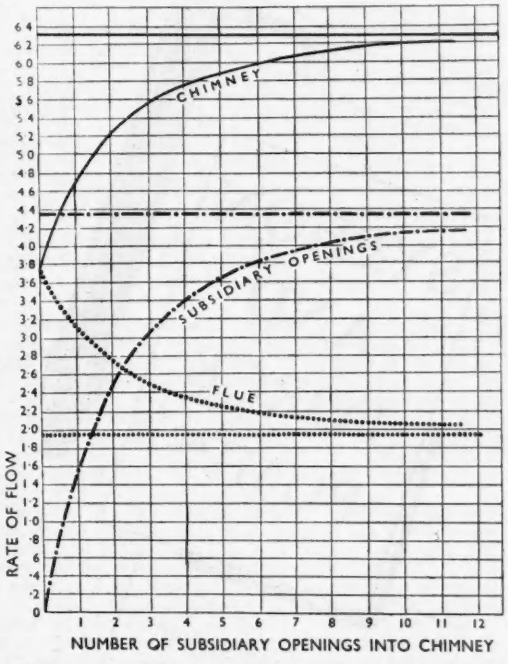


Fig. 1.—Effect on ventilation of increasing the number of subsidiary openings in the fire frame, these openings being independent of the the flue nozzle. With increasing area of opening in the fire frame, the total ventilation (curve marked "chimney") increases, while the amount passing through the flue nozzle decreases (curve marked "flue.")

The fact is often overlooked that while it is not only undesirable to throw too large a proportion of heat on to the floor, a result which is usually avoided by the use of reflector fenders, it is equally unsatisfactory to emit heat upwards towards the ceiling, as energy projected in that direction may be inefficiently utilized in the average room.

In designing a radiant fire, the spatial distribution of the energy emitted has to be taken into account, if the best use is to be made of the heat available. The ideal result will be attained if it can be ensured that the heat rays take the form of a beam spreading fanwise through the zone of the room normally occupied.

Such improvement in the distribution of heat influences comfort in a further direction. The unequal heating ascribed to some fires is in part due to the rate at which the intensity of the radiant energy decreases as the distance from the fire increases. In general, if the distance from an ordinary gas fire is doubled, the radiant intensity falls to about one-quarter. Any modification which increases the beam-like character of the radiant heat reduces this intensity gradient, and hence diminishes the contrast in warmth sensation between parts of the body at different distances from the fire.

Ventilation

The ventilation of living rooms depends to a large extent upon the chimney, but chimneys vary greatly in their ventilating capacity. The amount of air flowing up any particular chimney is, however, affected by the area of the opening into its base.

Inset fires of the type to be described later, which fit into coal fire settings, and rest on the grate, do not restrict the area of the inlet to the chimney. In the case, however, of hearth pattern fires, designed to fit closely in front of an existing grate, the air enters the chimney only through openings provided in the fire itself, and it is important not only that such openings shall permit of the necessary flow of air to maintain adequate ventilation of the room, but that they shall be so designed as to minimize the effect of chimney pull on the heating efficiency of the fire itself. This can best be done if the ventilation is effected in part through the flue outlet, and in part through subsidiary vents in the fire frame. An examination of the curves in Fig. 1 shows that as the total ventilation is increased by increase in the number or size of the subsidiary vents, the volume of the air actually passing over the heated surface of the fire, and through the flue outlet, decreases. The subsidiary vent system is adopted in the "Silent Beam" fire.

Luminous Flames

A number of considerations has led to the use of luminous flames. It will be realized that, with this type of flame, absolute silence of operation is attainable. All danger of lighting back is eliminated, and the choking of the jets due to atmospheric dust is avoided. In these respects the luminous flame type of fire has marked advantages over the orthodox type incorporating an atmospheric burner. Also, by a suitable combination of flame distribution and combustion chamber construction, the gradation of heating from top to bottom of the system may be made almost independent of gas rate over a very wide range.

The use of luminous flame has, however, introduced a number of new problems. The gases supplied by different undertakings vary widely in luminosity and in other characteristics affecting the size, shape and air requirements of the flames. By a suitable choice of jet sizes, it is possible to cover the whole of the normal range of calorific values in four groups.

The calorific value ranges are:

(A) 375-420 B.Th.U. per cu.ft.
(B) 425-470 " " "
(C) 475-520 " " "
(D) 525 upwards " "

The behaviour of the fires has been tested with gases of various types to ensure that the new method of construction enables a standard of combustion to be maintained at least as high as in the case of fires fitted with atmospheric burners. In the majority of cases the CO/CO_2 ratio in the products of combustion is considerably lower than is attainable with the best designs of fire fitted with atmospheric burners.

The incorporation of a gas pressure governor in the design of a fire has much to commend it, especially when the heating is effected by the use of luminous flames.

By the adoption of a design permitting of adjustment of the pressure which is to be maintained, it is possible to compensate for differences in specific gravity and calorific value. With luminous flames, a high combustion standard at overload, following increase of pressure, can be attained. The additional use of a governor improves still further the performance of the fire from the hygienic standpoint.

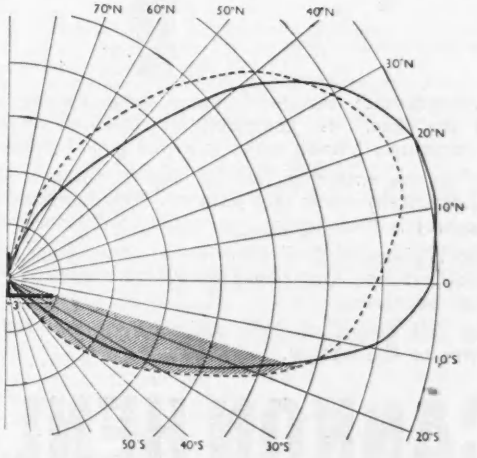
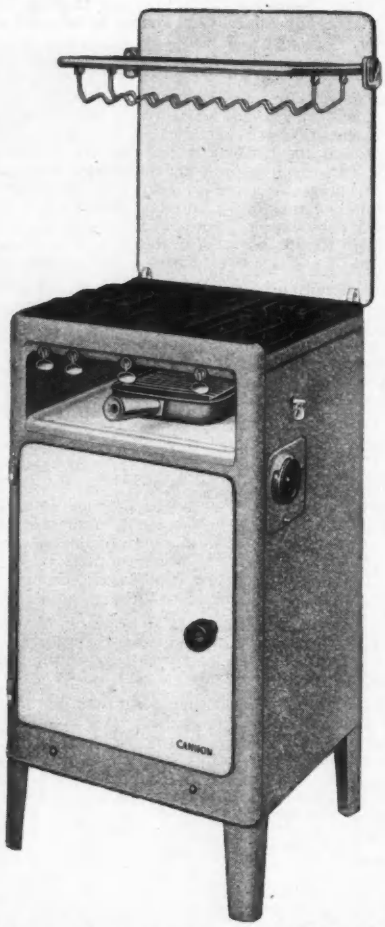


Fig. 3.—Solid line, "Silent Beam" Fire; Dotted line, Columnar Radiant Fire.

Distribution of radiant heat from "Silent Beam" and Columnar Radiant fire. The curves indicate the variation in the meridan plane of the intensity of the heat emitted by the two fires when measured on a hemisphere of 3-ft. radius with the fire at the centre. The shaded areas represent the heat falling on to a hearth projecting 3-ft. in front of the fires.

THE COOKER THAT HAS EVERYTHING



In appearance and finish the Cannon Henley is unique in its class. Its completely streamlined design and "Porceliron" finish make it a real good-looker.

When the enamelled folding top is raised a plate rack automatically comes into position. The Autimo Oven-heat Control is flush fitting, yet easily read from the front.

The High-speed Grill heats up in one minute from cold. The Cast Iron Linings are enamelled and have embossed shelf positions.

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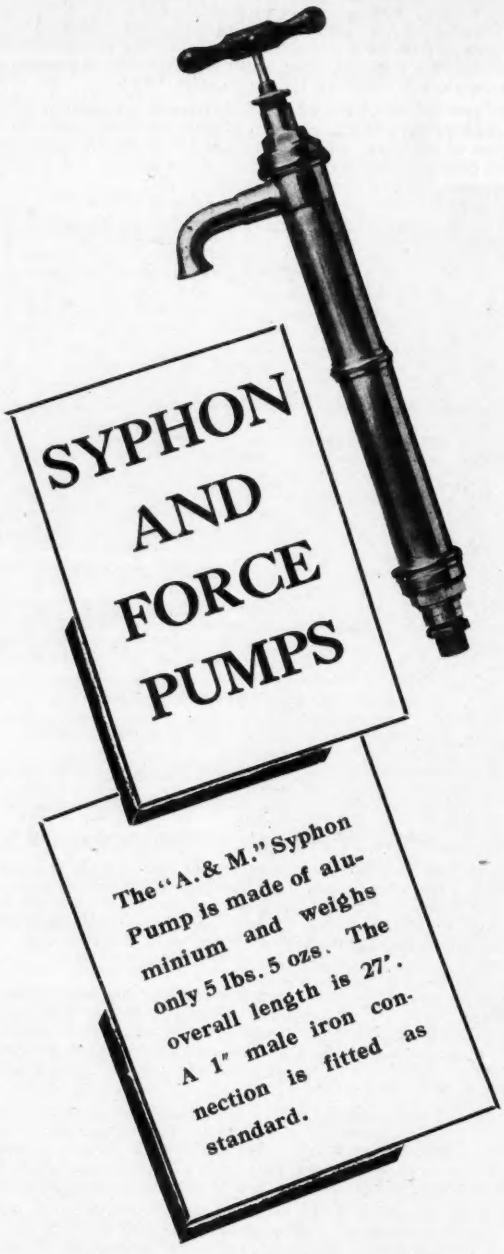
SYPHON AND FORCE PUMPS
The "A. & M." Syphon Pump is made of aluminium and weighs only 5 lbs. 5 ozs. The overall length is 27". A 1" male iron connection is fitted as standard.

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The "Silent Beam" Fire

The "Silent Beam" fire is illustrated in Fig. 2, and a diagrammatic sketch is given in Fig. 5.

In this fire, effort has been concentrated on perfecting a radiant heater of the self-contained type and of formal design. Luminous flames are employed, the columnar radiant has been abandoned, and a continuous combustion chamber with concealed "scrubbing" elements has been adopted. The rear wall of this chamber has been freed completely from ribs or other projections, in order to attain the "full radiator" effect and mask details.

Although the actual depth of the combustion chamber varies from ¼ in. to ¾ in., an illusion of greater depth is attained and the

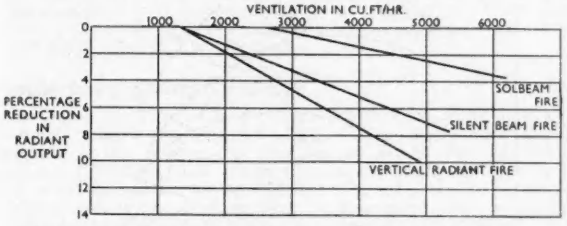

Fig. 4—The effect of ventillation on the bench efficiency of the "Silent Beam" and "Solbeam" Fires compared with a vertical radiant Fire.

impression is produced of a yellow-hot enclosure like a furnace, which is observed through a grill of pleasing design.

High duty refractory materials have been developed to withstand the higher temperature attained in the combustion chamber, and the necessary heat-resisting qualities have been combined with a low thermal conductivity in order to minimize heat losses through the back of the fire. The materials used in the manufacture of the front structure have been selected to withstand both thermal and mechanical shock and the design adopted combines mechanical strength with a moderate weight of material.

The plane of the radiating surface is inclined backwards only to the extent desirable to give stability to the superimposed front structure, and at the same time to avoid the need for a projecting canopy for the directing of the products into the chimney. By the use of a front structure of suitably shaped and spaced horizontal bars, it has been possible to attain a greater proportion of useful heat than with the orthodox type of radiant. The proportion of the heat thrown upwards towards the ceiling, as well as downwards towards the hearth, is reduced, and the heat rays are largely emitted as a beam spreading fanwise through the zone of the room normally occupied. The resulting increase in heating efficiency, although difficult to assess quantitatively, is very appreciable under practical conditions.

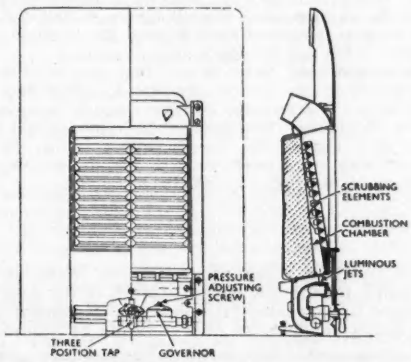

Fig. 5.—Diagram showing construction of the "Silent Beam" Fire.

The curves in Fig. 3 indicate the variation in the meridian plane of the intensity of the heat emitted by the "Silent Beam" and a columnar radiant gas fire, when measured on a hemisphere of 3 ft. radius with the fire at the centre. The decrease in the proportion of heat falling on the floor is also reflected in an increase in the radiant efficiency recorded when the fire is stood on a hearth. The "Silent Beam" curve is for the two-unit fire without projecting fender, while the columnar radiant fire used for comparison was fitted with a reflector fender.

The penetrative characteristics of the emitted heat, to which reference is made in the introductory section of the brochure, are indicated by the results given in Table 1.

TABLE I.

Penetrancy of radiation from various sources.

Source.	Percentage transmitted by standard horn screen.
"High Beam" Fire	10.0
"Solbeam" Fire	10.5
"Silent Beam" Fire, 2 unit	13.5
3 unit	14.0
Clinical Gas Lamp	18.0

Premature loss of heated products through the front structure is minimized by reduction of eddies in the gas stream, and by the "echelon" arrangement of the horizontal bars. Other features of the design have been influenced by the need for simplifying the method of assembly, and for ensuring accurate location in relation to the flames and fire-brick back.

The size of the flue outlet has been adjusted so that the fire satisfies the Lancet test. The subsidiary vents at the rear of the frame, while allowing of the additional ventilation desirable on hygienic grounds, minimize the effect of chimney pull on the radiant efficiency of the fire.

The effect of ventilation on the bench efficiency of the fire is shown by the curves in Fig. 4. The radiant efficiency attained when the "pull" was just sufficient to ensure that all products of combustion passed up the chimney has been taken as the basis of calculation. The decrease in efficiency with increase in the total air flow is expressed as a percentage of that figure. It is known that in certain settings there is recorded for solid fuel fires a negligible fall in radiant efficiency as the total air flow up the

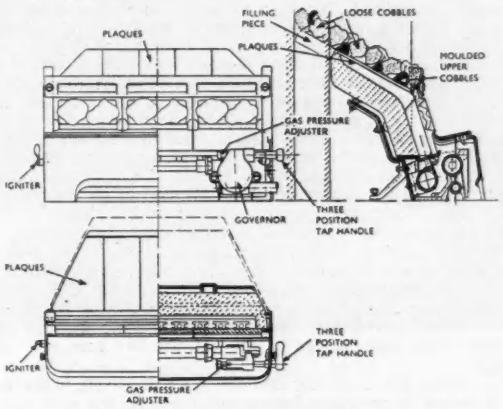

Fig. 6.—Diagram showing construction of the "Solbeam" Fire.

chimney increases, and it is important, especially in the case of hearth type gas fires, that the heating effect shall not suffer unduly with increase in chimney pull.

It may be mentioned at this stage that, after lighting, the "Silent Beam" fire attains 90% of its full output in 12 minutes, as compared with the 14 minutes required by existing modern types of radiant fire.

Control of Gas Supply

The general arrangements provided for gas control are shown in Fig. 5.

The use of jets covering a range of calorific value enables the calorific value control to be omitted. The usual pressure control also is eliminated, but a governor is supplied as an integral part of the fire, and means are provided for the adjustment of the outlet pressure of the governor. This enables the correct gas rate to be attained, and maintained under all conditions. The initial setting, effected by rotating the pressure adjusting screw, is done with the aid of a gauge attached to the pressure point on the left-hand end of the burner. Owing to the variation of gas characteristics from one undertaking to another, no general instructions can be given as to the correct delivery pressure to which the governor should be set. This usually approximates to 20/10ths W.G., but the appropriate value should be determined for their supply by the gas undertaking, by previous measurement with a test meter connected in the gas supply. The normal rating of the 2-unit fire is 15,000 B.Th.U./hour, and of the 3-unit fire 22,500 B.Th.U./hour.

The three-position tap enables fixed fractions of the full-on consumption to be attained whenever desired. This greatly facilitates the regulation of the fire by the user.

The lighting of the fire is effected by means of an independent flint ignition unit of the latest and most reliable design. This is

housed in the front panel, which can be removed easily when inspection or replacement of flints is necessary.

The "Solbeam" Fire

An analysis of the psychological appeal of domestic fires suggests that the following points are of importance:

(1) Brightly incandescent masses surrounded by, or intermingled with, relatively large black masses, by providing a notable contrast, eliminate glare and induce a feeling of restfulness.
(2) The absence of a set pattern is found to be satisfying by many people.
(3) A deep incandescent mass is desirable, and this should be so arranged that it is not possible at a glance to get a complete picture of the make-up of the fire—something should be left to the imagination, and it is preferable that a certain amount of detail should not be discernible readily.
(4) The fire should be silent in operation.

In addition it must be remembered that:

(*a*) Most people have grown up with the coal fire as a prominent feature of their environment, and feel there is something missing if a completely dissimilar source of heat is employed.
(b) The solid fuel fire has certain practical advantages in an ordinary household—e.g., its use as an incinerator for cigarette ends, &c.

The "Solbeam" fire has been designed to satisfy the above requirements.

The construction shown in Fig. 6 is, in essence, similar to that of the "Silent Beam" fire, described earlier. The rear wall of the combustion chamber is, for the most part, free from any projection likely to interfere with the attainment of the "full radiator" effect. It is only in the upper portion that the brick is provided with ribs which serve to support the perforated refractory plaques on which the moulded upper cobbles rest. The luminous flame is generated in the lower portion of the fire, and the scrubbing of the burning gases is effected by the use of projections on the rear side of the front members, and by passage through the plaques referred to above. Owing to the enclosing of the combustion chamber by the front structure, an effect similar to that of a furnace is attained, and when alight the fire produces that feeling of cheerfulness and sensation of "warming" warmth which is so desirable.

The variability of the dimensions of coal grate settings has always been a serious obstacle to the development of the inset fire. The use of loose cobbles offers an especial advantage in the making good of any gap that may exist between the frame of the fire and the coal grate setting. As will be seen from Fig. 7, the arrangement adopted renders easy the making of a good fit, and avoids the impression that the use of the gas fire has been an "afterthought."

The radiant efficiency recorded for this type of fire, when tested on the bench, is somewhat lower than that attained with the best types of hearth pattern fire, but as the "installation losses" of the "Solbeam" fire are appreciably less, the difference in efficiency under average working conditions is less than would appear from a consideration of the bench efficiency only. Owing to the manner of distribution of the energy emitted (*vide* Fig. 8), the floor losses are very small. Further, as with solid fuel fires, when fitted in certain types of brick setting, the heating efficiency is but little influenced by chimney pull. The variation of the radiant efficiency with chimney pull, in a suitable setting, is indicated in Fig. 4.

When tested apart from a coal grate setting, 90% of the maximum output of the "Solbeam" fire is attained 19 minutes after lighting.

Control of Gas Supply

The general arrangement of the gas supply unit and the "flint" lighter is shown in Fig. 6. As in the case of the "Silent Beam" fire, ignition of the gas is effected by a separate ignition unit, easily detachable to facilitate replacement of the "flint."

The supply of gas is governor-controlled, but, owing to the greater space available in the "Solbeam" fire, there has been incorporated a new type of governor unit which avoids the need for a separate tap to control the gas flow. The initial adjustment of the fire is effected by rotating the knurled head on the left of the unit after releasing the clamping screw on the body.

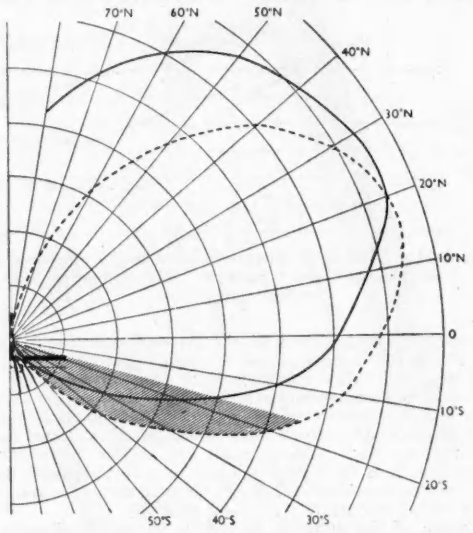

Fig. 8.—Solid line, "Solbeam" Fire; dotted line, Columnar Radiant Fire.

Distribution of radiant heat from "Solbeam" and Columnar Radiant fire. The curves indicate the variation in the meridan plane of the intensity of the heat emitted by the two fires when measured on a hemisphere of 3-ft radius with the fire at the centre. The shaded areas represent the heat falling on to a hearth projecting 3-ft. in front of the fires.

The head is rotated until the desired pressure is attained at the pressure point. The governor unit serves not only to turn on and off the gas supply, but permits of reduction of the consumption from "full-on" to fixed fractions of its normal value, by the turning of the three-position thumbpiece provided for this purpose. By turning the thumbpiece beyond the "full-on" position the governor valve can be lifted off its seating.

As in the case of the "Silent Beam" fire, no general instructions can be given as to the correct pressure to which the governor should be set. The required pressure usually approximates to 20/10ths in. W.G., but the appropriate value should be determined for their supply by the gas undertaking, by previous measurement with a test meter connected in the gas supply. The normal rating of this fire is 22,500 B.Th.U./hour.

Mechanical World Year Book

1940 Edition*

Steam raising is one of the oldest practices of the industrial era, and while it has long been at a high pitch of perfection, its continued development in recent times is shown by the fact that the 1940 edition of the "Mechanical World Year Book" contains —not a re-written or revised section—but an entirely new section on Steam Boilers. The accompanying sections on Boiler Construction and Boiler Mounting, Fittings and Instruments, have been brought into line with this new work wherever progress has indicated the need.

As part of the scheme for "circulating" sections in adjacent editions, the section dealing with External Pressure on Tubes, Cylinders, and Pans has been brought back into the 1940 edition. This is a subject of wide application and practical utility to a great many industries.

Attention has been given particularly to war-time needs in selecting matter for the new edition. Much of the data presented is appropriate to the industrial needs of the moment, while the tabulated matter continues to offer a wealth of information.

A new and separate index to the tables has been compiled for the new edition.

* Emmott & Co., Ltd., 28, Bedford Street, Strand, W.C.2, 220 pp.; price, 1s. 6d. net.

Electrical Year Book 1940*

New sections in the Electrical Year Book for 1940 deal with electrical methods of measuring temperature (including pyrometers and distance thermometers) and electric braking (for D.C. and A.C. motors). New matter is also included on crawling and single phasing of induction motors, and on 3-phase commutator motors. The tariff section has been revised and new matter included on the block tariff. The tables of conductors have been revised to conform with the latest I.E.E. regulations.

* Emmott & Co., Ltd., 31, King Street West, Manchester 3. 376 pp.; price 1s. 6d. net.

Trade News

British Timken, Ltd.

Mr. R. Turner Hood, formerly chief Scottish Sales Representative for Messrs. British Timken, Ltd., of Cheston Road, Aston, Birmingham, the manufacturers of tapered roller, ball and parallel roller bearings, has now been appointed Chief of the Mechanical Engineering Department of this Company. Mr. Hood served his apprenticeship with Messrs. Barr and Stroud, Ltd., of Glasgow, manufacturers of marine and aeronautical instruments, for the high quality of which they are well-known. Mr. Hood has been associated with the manufacture and application of ball and roller bearings for the last thirteen years, experience which will be of great value in his new post.

Brotherhood Steam Turbines

In a new brochure (T.S. 40) Peter Brotherhood, Ltd., of Peterborough, deal comprehensively with their well-known steam turbines. After reference to the various applications of steam turbines, the publication, which is copiously illustrated, goes into details of the system, giving figures and graphs relating to steam consumption, "pass out" working, back-pressure and condensing working, together with a section on general specifications. An illustration is given of an installation of six Brotherhood high-pressure gas compressors in a large chemical works. These are driven through double reduction gearing by Brotherhood steam turbines of 1,500, 2,400, and 3,600 b.h.p. running at 4,000 r.p.m. The speed of the compressors is 120/130 r.p.m. A photograph is also included of a 130 h.p. turbine-driven exhauster installed in a gas-works; this operates at 13,000 r.p.m. In a list of prominent users of Brotherhood steam turbines it is noted that a considerable number are gas undertakings.

Gas Undertaking Results

Bilston

Directors of the Bilston Gas Light and Coke Company, in presenting to the shareholders the 94th annual report, say that the profit and loss account, after paying the interim dividends, shows a credit balance of £15,611. It is proposed to pay on Jan. 1, 1940, further dividends of 6s. per share on the "A" shares, less tax, and 4s. 6d. per share on the "B" shares, less tax (making with the interim dividends paid in July last, 12s. and 9s. per share respectively for the year), leaving the balance to be carried forward. Owing to the increased cost of coal, materials and expenditure on A.R.P. and other emergencies, the price of gas was advanced from the midsummer readings to a maximum of 10d. per therm, the advance being in no case more than 0.67d. per therm. During the year considerable capital has been expended on new plant and mains in addition to maintaining fully the existing plant. Mr. H. S. Adams resigned his position as Engineer and Manager, and the Directors appointed Mr. K. L. Pearce to fill the vacancy. Mr. A. Bradford Legg has retired after serving the Company 53 years, and the new Secretary is Mr. R. Thompson.

Toronto

"The Consumers' Gas Company of Toronto has now completed its 91st year in the public service. All through its long history the Company has shown a keen desire to live up to its statutory obligations and moral obligations as well, and its record both as to the reliability and quality of the service rendered and the low rates charged for that service reflects the integrity and good faith which have at all times characterized the administration of the Company's affairs." These words are taken from the address which Mr. Thomas Bradshaw, as President, had intended to deliver to the proprietors, but unhappily he died before the date of the meeting. It was shown by the accounts that an amount of $298,308 has been withdrawn from the Reserve Fund. On the other hand, there has been added to the plant and buildings renewal fund an amount of $581,529. Thus the net result of the year's operations to Sept. 30 is the addition to the Company's funds of $283,221. The corresponding figure for the previous year was $216,140. While the income from gas sales has shown some diminution, as compared with 1938, the comparatively slight decline shows up favourably by contrast with the recession experienced in other industries. A provision of the War Budget passed by the Dominion Government which applies directly to the company's business is the removal of "Gas Used in Dwellings" from the list of items exempted from sales tax. All gas used in dwellings on and after Sept. 12 thus became subject to 8% sales tax. Another provision increases the Dominion income tax on Corporations from the former 15% to 18%.

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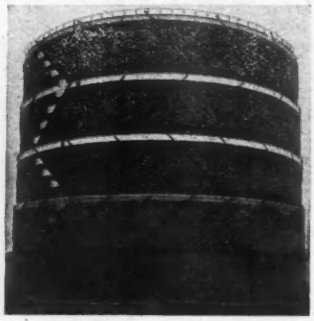

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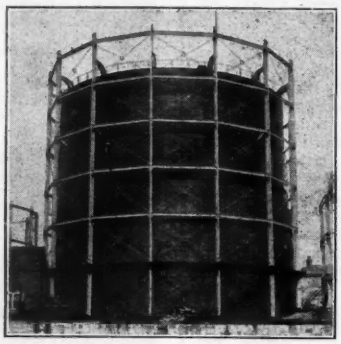

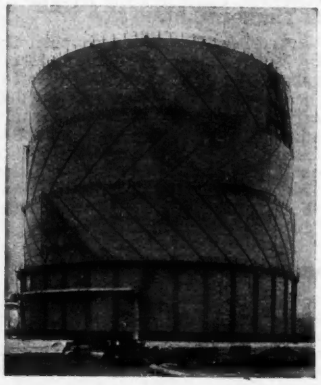

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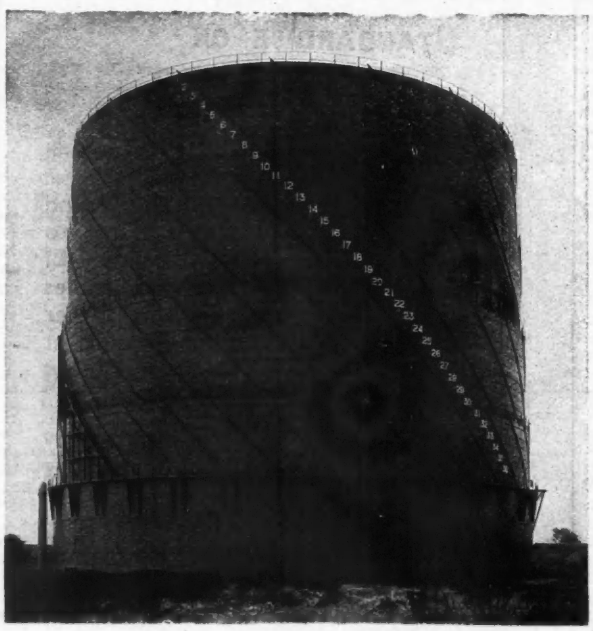

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Current Sales of Gas Products

The London Market

Jan. 15.

Present prices of tar products in the London market are as follows:

Pitch about 35s. per ton f.o.b.

Creosote about 5d. per gallon.

Refined tar 3¼d. to 4d.

Toluole is now controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold.

Pure benzole about 1s. 10d.

95/160 solvent naphtha about 1s. 11d. to 2s.

90/160 pyridine 14s. to 14s. 6d.

All per gallon naked.

Refined naphthalene crystals about £16 per ton in bags.

All *ex* makers' works.

The Provinces

Jan. 15.

Crude Gas-Works Tar, 18s. to 23s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 32s. 6d. to 35s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 32s. 6d. to 35s.* Toluole, naked, North, 1s. 9½d. (Controlled by the Ministry of Supply Order No. 1, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 9d. to 9½d. Solvent naphtha, naked, North, 1s. 8d. to 1s. 9d. Heavy naphtha, North, 1s. 4½d. to 1s. 5½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4½d. to 4¾d.; Scotland, 4¾d. to 4¾d.; low gravity, 4½d. to 4¾d. Carbolic acid, 60's. 3s. 1½d. to 3s. 3d. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil, (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5¼d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls, whatever they may be.

Scotland

GLASGOW, Jan. 13.

While home market is still comparatively quiet there are signs of increased demand for export. Meantime there is no alteration of any consequence to report in prices.

Crude gas-works tar.—Actual value remains at round 30s. to 32s. per ton *ex* works in bulk.

Pitch.—Demand is increasing and value is round 24s. per ton f.o.b. for export and round 22s. per ton *ex* works in bulk for home trade.

Refined tar.—Competition is keen for any orders on the market, but prices are unchanged at 3¾d. to 4d. per gallon for home trade and about 2¼d. to 2¾d. per gallon for export, both naked at makers' works.

Creosote oil.—Throughput continues quite normal with makers' prices as under: Specification oil, 5d. to 5¼d. per gallon; low gravity, 5¼d. to 6d. per gallon; neutral oil, 5¼d. to 5¾d. per gallon; all *ex* works in bulk.

Cresylic acid.—Home consumers appear to be comfortably placed and enquiries are therefore rather scarce. Makers' prices are maintained at round the following: Pale, 97/99%, 2s. 2d. to 2s. 4d. per gallon; dark, 97/99%, 1s. 10d. to 2s. per gallon; pale, 99/100%, 2s. 6d. to 2s. 9d. per gallon; all *ex* works in buyers' packages.

Crude naphtha is not readily procurable although value is called 6½d. to 7d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 7½d. to 1s. 8¼d. per gallon and 90/190 heavy naphtha is 1s. 3½d. to 1s. 4½d. per gallon.

Motor benzole is 1s. 6½d. to 1s. 7d. per gallon.

Pyridine.—Supplies being scarce, prices are nominal at 14s. to 15s. per gallon for 90/160 grade and 16s. to 17s. per gallon for 90/140 grade.

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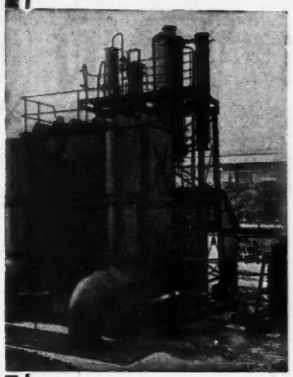

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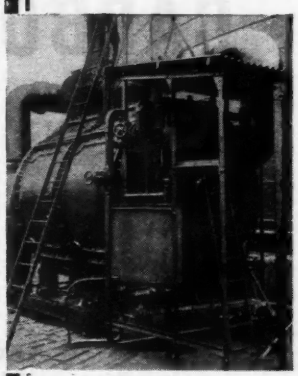

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GAS STOCKS AND SHARES

There was no abatement of the activity in the gilt-edged section of the Stock Exchange last week, though owing to several periods of profit-taking prices fluctuated and ultimately closed at about their commencing levels. More business was noticeable among home rails, but the uncertainty as regards the forthcoming dividend announcements is a check upon price improvements. Industrials generally were dull and neglected with prices tending to sag. Oil shares, though idle throughout the week, brightened up at the close, but rubbers weakened in sympathy with the commodity price. There was a moderate demand for gold-mining shares.

The slightly better turnover in the Gas Market noticeable last week continued and more upward movements in prices were recorded than for some time past. Gas Light units maintained their previous week's higher level, while Imperial Continental gained 8 points to 79½. Many of the other increases, which occurred mainly among fixed-interest stocks, were occasioned by margins narrowing to 5 points, and the best of these was Portsmouth 5% preference which closed 5½ points higher at 90¼. On the other hand, Alliance and Dublin reacted 5 to 115, the stock changing hands at 114½, and it will be seen below that a few other stocks also closed lower. The only alteration of note on the Provincial Exchanges was a drop of 10 points in Sunderland maximum stock, thus bringing it more into line with current values. Nominal quotations in the Supplementary List remained unchanged.

Some "Gas" dividend announcements will doubtless appear during the current week and these are awaited with interest. It is already known that some reduction in distribution will be inevitable among a number of the Metropolitan and Suburban Companies and doubtless there will be few undertakings in the Provinces not similarly affected.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week.
1,767,439	Sept. 4	8	8	Alliance & Dublin Ord. ...	110—120	-5
374,000	Dec. 27	4	4	Do. 4 p.c. Deb. ...	73—78	...
877,576	Nov. 6	5	5	Ascd. Gas & Water U'd'ts Ord.	14/6—16/6	...
500,000	"	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	17/—19/-	...
535,545	"	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/-	...
318,730	"	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/6—15/6	-1/6
750,000	Sept. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	80—85	...
560,070	Aug. 21	7	7	Barnet Ord. 7 p.c.	110—120	...
300,000	Oct. 9	1/9⅔	1/4⅔	Bombay, Ltd.	19/6—20/6	...
181,185	Aug. 21	9½	9½	Bournemouth Sliding Scale ...	147—152	+2½
690,526	"	7	7	Do. 7 p.c. max. ...	120—125	+2½
493,960	"	6	6	Do. 6 p.c. Pref. ...	115—120	-2½
50,000	Dec. 18	3	3	Do. 3 p.c. Deb. ...	68—73	...
362,025	"	4	4	Do. 4 p.c. Deb. ...	90—95	...
335,000	"	5	5	Do. 5 p.c. Deb. ...	105—110	+3
257,900	Aug. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	105—110	...
689,955	"	6⅔	6⅔	Do. 5 p.c. Con. ...	100—105	...
205,500	"	6	6	Do. 6 p.c. 'B' Pref. ...	95—105	...
855,000	Sept. 18	8	7	British Ord.	90— 95	...
100,000	Dec. 18	7	7	Do. 7 p.c. Pref.	118—123	...
350,000	"	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	108—113	...
120,000	"	4	4	Do. 4 p.c. Red. Deb. ...	73—78	...
450,000	"	5	5	Do. 5 p.c. Red. Deb. ...	98—103	...
100,000	22 May '33	6	4	Cape Town, Ltd.	¼—¾	...
100,000	6 Nov. '33	4½	4½	Do. 4½ p.c. Pref.	¼—¾	...
150,000	Dec. 18	4½	4½	Do. 4½ p.c. Deb.	55—65	...
626,860	July 17	6	6	Cardiff Con. Ord.	95—105	...
237,860	Dec. 18	5	5	Do. 5 p.c. Red. Deb. ...	95—100	...
98,936	Oct. 9	2/-	2/-	Colombo Ord.	1 7/16—1 7/16	...
24,510	"	1/4⅔	1/4⅔	Do. 7 p.c. Pref.	20/6—22/6	...
739,453	Sept. 27	-/11.48	-/11.48	Colonial Gas Assn. Ltd. Ord. ...	15/—17/-	...
296,144	"	1/3.30	1/3.30	Do. 8 p.c. Pref.	20/6—22/6	...
1,775,005	July 31	4	4	Commercial Ord.	47—57	...
140,000	Aug. 21	4	4	Do. 4 p.c. Red. Pref. ...	88—93	...
620,000	Dec. 11	3	3	Do. 3 p.c. Deb.	55—60	...
286,344	Aug. 21	5	5	Do. 5 p.c. Deb.	91—96	+3½
200,000	"	3⅔	3⅔	Do. 3⅔ p.c. Red. Deb. ...	94— 99	...
807,560	July 31	7	7	Croydon sliding scale	100—105	...
644,590	"	5	5	Do. max. div.	80—85	...
620,..15	Dec. 27	5	5	Do. 5 p.c. Deb.	90—100	...
208 660	Aug. 21	5	5	Dudley, Brierley Hill & Dist. Ord.	100—105	...
82,275	"	5	5	Do. 5 p.c. Con. Pref. ...	92—102	...
79,000	"	3⅔	3⅔	Do. 3⅔ p.c. Red. Deb. ...	94—99	...
239,000	July 31	5	5	East Hull Ord. 5 p.c.	80—90	...
187,215	Aug. 21	6	5⅔	East Surrey Ord. 5 p.c. ...	98—103	...
176,211	Dec. 18	5	5	Do. 5 p.c. Deb. ...	90—100	...
250,000	Nov. 13	8	4	Gas Consolidation Ord. 'B' ...	14/—17/-	...
250,000	"	4	4	Do. 4 p.c. Red. Cum. Pref.	16/—18/-	...
19,152,410	July 31	5⅔	5⅔	Gas Light & Coke Ord. ...	16/3—17/3a	...
2,600,000	"	3½	3½	Do. 3½ p.c. max.	60—65	+2
4,477,106	"	4	4	Do. 4 p.c. Con. Pref. ...	79—84	...
2,993,000	Jan. 2	3⅔	3⅔	Do. 3⅔ p.c. Red. Pref. ...	80—90	...
8,602,497	Nov. 27	3	3	Do. 3 p.c. Con. Deb. ...	69—74	+1
3,642,770	"	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
3,500,000	"	4½	4½	Do. 4½ p.c. Red. Deb. ...	99—104	...
700,000	Sept. 4	3½	3½	Do. 3½ p.c. Red. Ded. ...	85—90	...
270,466	July 31	6	6	Harrogate New Cons.	95—100	...
157,500	Mar. 20	‡1/-	‡1/-	Hong Kong and China Ord. ...	¼—¾	...
5,400,000	Oct. 23	12	4	Imperial Continental Cap. ...	77—82	+8
172,810	July 31	3½	3½	Do. 3½ p.c. Red. Deb. ...	81—86	...
63,480	Dec. 18	3	3	Maidstone 3 p.c. Deb.	55—60	...
45,000	"	†10	†8	Malta & Mediterranean ...	92—102	...
392,000	Oct. 2	5½	5½	Metropolitan (of Melbourne) ... 5½ p.c. Red. Deb.	95—100	...
231,977	Aug. 21	5	5	M.S. Utility 'C' Cons.	75—80	...
968 ,658	"	4	4	Do. 4 p.c. Cons. Pref. ...	72—77	...
390,076	Dec. 18	4	4	Do. 4 p.c. Deb. ...	72—82	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12.	Rise or Fall on Week.
148,955	Dec. 18	5	5	M.S. Utility 5 p.c. Deb. ...	95—100	...
125,000	Jan. 2	3½	3½	Do. 3½ p.c. Red. Bds. ...	90—95	...
675,000	Nov. 6	†3	†4	Montevideo, Ltd.	50—60	...
250,000	Aug. 21	7½	7½	North Middlesex 6 p.c. Con. ...	105—115	...
396,160	July 31	5	5	Northampton 5 p.c. max. ...	90—95	...
300,000	Nov. 6	†7	9	Oriental, Ltd.	118—128	...
468,537	Dec. 11	8	7	Plymouth & Stonehouse 5 p.c.	98—103	...
621,667	July 31	8½	8⅓	Portsmouth & Gosport Cons.	111—116	-1
241,446	"	5	5	Do. 5 p.c. max.	80—90	...
73,350	"	5	5	Do. 5 p.c. Pref.	88—93	+5½
75,000	"	4	4	Do. 4 p.c. Pref.	75—80	+2½
114,000	July 31	5	5	Preston 5 p.c. Pref.	90—95	-2½
247,966	Dec. 18	4	4	Primitiva 4 p.c. Cons. Deb. ...	93—98	...
625,959	July 17	4	4	Do. 4 p.c. Red. Deb. ...	93—98	...
15,000	Sept. 4	6	6	San Paulo 6 p.c. Cum. Pref. ...	7¼—8½	...
441,275	Oct. 9	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	16/—19/-	...
460,810	Oct. 2	-/10⅔	-/10⅔	" 4½ p.c. Cum. Pref. ...	17/—19/-	...
133,201	Aug. 21	5	8½	Shrewsbury 5 p.c. Ord. ...	107—117	...
9,000	June 5	†4	†4	South African Ord.	4—5	...
1,996,297	Aug. 21	1/2⅔	1/2⅔	South East'n Gas Cn. Ld. Ord.	15/6—17/6	...
1,000,000	"	-/10⅔	-/10⅔	Do. 4½ p.c. Red. Cum. Pref.	17/—19/-	...
769,191	"	4	4	Do. 4 p.c. Cum. Pref. ...	14/6—16/6	...
150,000	"	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
6,709,895	July 31	6	5	South Met. Ord.	61—66	...
1,135,812	"	6	6	Do. 6 p.c. Irred. Pref. ...	98—103	...
850,000	"	4	4	Do. 4 p.c. Irred. Pref. ...	73—78	...
1,895,445	Dec. 27	3	3	Do. 3 p.c. Deb.	65—70	+3
1,000,000	July 17	5	5	Do. 5 p.c. Red. Deb. ...	97—102	...
600,000	"	3⅔	3⅔	Do. 3⅔ p.c. Red. Deb. ...	92—97	...
1,543,795	July 31	6	6	South Suburban Ord. 5 p.c. ...	77—82	...
512,925	"	5	5	Do. 5 p.c. Pref.	90—95	...
500,000	"	4	4	Do. 4 p.c. Pref.	75—80	...
250,000	"	3⅔	3⅔	Do. 3⅔ p.c. Red. Pref. ...	85—90	...
888,587	Dec. 11	5	5	Do. 5 p.c. Deb.	95—100	+2
250,000	"	4	4	Do. 4 p.c. Deb.	77—82	...
200,000	July 31	3	3½	Do. 3½ p.c. Red. Deb. ...	85—90	...
427,859	Sept. 18	1/2⅔	9⅔	S. Western Gas & Water Ord.	13/—15/-	...
160,523	Oct. 9	-/10⅔	-/10⅔	Do. 4½ p.c. Red. Cum. Pref.	17/6—19/6	...
110,000	Dec. 18	4	4	Do. 4 p.c. Red. Deb. ...	90—95	...
750,541	July 31	5½	5	Southampton Ord. 5 p.c. ...	75—85	...
148,836	Dec. 27	4	4	Do. 4 p.c. Deb.	75—80	...
350,000	July 31	5½	5½	Swansea 5½ p.c. Red. Pref. ...	90—100	...
200,000	Dec. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—100	...
1,076,490	July 31	6½	6½	Tottenham and District Ord....	85—95	...
409,835	"	5½	5½	Do. 5½ p.c. Pref.	95—105	...
62,235	"	5	5	Do. 5 p.c. Pref.	85—95	...
453,380	Dec. 11	4	4	Do. 4 p.c. Deb.	78—83	...
1,247,505	Oct. 23	6	4	U. Kingdom Gas Cor. Ord. ...	13/—15/-	-/6
1,085,952	Nov. 20	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	14/—16/-	...
772,709	"	4	4	Do. 4 p.c. 1st Red. Cum. Pf.	14/6—16/6	...
745,263	Dec. 18	4½	4½	Do. 4½ p.c. 2nd Non-Cum. Pf.	12/6—14/6	...
1,093,656	Sept 18	3⅔	3⅔	Do. 3⅔ p.c. Red. Deb. ...	85—90	...
378,106	Mar. 6	7	7	Uxbridge, &c., 5 p.c.	90—100	...
133,010	"	5	5	Do. 5 p.c. Pref. ...	95—105	...
1,371,138	July 31	7	6½	Wandsworth Consolidated ...	88—93	...
2,525,768	"	4	4	Do. 4 p.c. Pref.	75—80	+2
1,343,964	Dec. 18	5	5	Do. 5 p.c. Deb.	95—100	+2½
383,745	"	4	4	Do. 4 p.c. Deb.	75—80	...
400,000	"	3⅔	3⅔	Do. 3⅔ p.c. Red. Deb. ...	90—95	...
558,342	July 31	6⅔	6⅔	Watford and St. Albans Ord. ...	95—100	+2½
200,000	"	5	5	Do. 5 p.c. Pref.	85—95	...
200,000	"	5½	5½	Do. 5½ p.c. Pref.	90—100	...
200,000	"	4	4	Do. 4 p.c. Rd. Pf. (1973/8)	85—90	...
100,000	"	—	33/4⅔	Do. 4 p.c. Red. Pf. (1959)	95—100	...
200,000	Dec. 11	3½	3½	Do. 3½ p.c. Red. Deb. ...	83—88	...

a.—The quotation is per £1 of Stock. * Ex. Div. † Paid free of income-tax. ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Contd.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Nominal Quotations Jan. 12.	Rise or Fall on Week.
202,152	Sept. 4	5	5	Ascot Ord.	80—90	...
128,182	Dec. 27	5	5	Do. 5 p.c. Pref. ...	88—93	...
31,035	Aug. 21	-/4½	-/4½	Associated Utilities 4 p.c. Pref.	15/—17/-	...
100,000	Dec. 18	3½	3½	Do. 3½ p.c. Red. Deb. ...	90—95	...
17,000	Aug. 21	8	8	Bognor Orig. Ord. 'A' ...	105—115	...
62,210	,,	8	8	Do. New Add. 'A' ...	105—115	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	100—110	...
37,440	July 31	10	10	Cam. Univ. & Town 10 p.c. max.	110—120	...
135,970	,,	7	7	Do. 7 p.c. max.	90—100	...
39,025	,,	5	5	Do. 5 p.c. max.	80—90	...
96,410	July 17	4½	4½	Cardiff 4½ p.c. Pref.	92—97	...
85,520	July 31	6	6	Colchester 6 p.c. Pref.	95—100	...
90,550	Sept. 18	5	5	Do. 5 p.c. Deb. ...	100—105	...
150,000	July 31	4	4	Croydon 4 p.c. Pref.	70—75	...
130,000	Dec. 27	4	4	Do. 4 p.c. Deb.	75—80	...
65,000	Aug. 21	7½	7½	Eastbourne 'A' 5 p.c.	105—115	...
198,000	,,	6	6	Do. 'B' 3½ p.c.	90—100	...
112,312	,,	5	5	Do. 5 p.c. Pref.	90—95	...
130,000	Dec. 18	5	5	Do. 5 p.c. Deb.	95—105	...
130,500	Aug. 10	7½	7½	Exeter New Ord. (£10) ...	10—12	...
24,000	Aug. 21	8½	8½	Gt. Yarmouth 8½ p.c. max. (£30)	15—20	...
39,400	,,	7½	7½	Do. 7½ p.c. max. (£30) ...	10—15	...
81,160	Dec. 11	5½	5½	Do. 5½ p.c. Deb.	102—107	...
182,600	Sept. 4	9	8	Guildford Cons.	110—120	...
54,055	,,	5	5	Do. 5 p.c. Pref.	90—95	...
68,250	Dec. 11	5	5	Do. 5 p.c. Deb.	90—95	...
186,680	Aug. 21	7	7	Hampton Court Cons. ...	100—110	...
86,046	June 19	‡4½	‡5	Holyh'd&N.W.G.&W.Cpn.Ord.	13/6—15/6	...
80,000	Aug. 21	4	4	Lea Bridge 4 p.c. Pref.	65—75	...
40,000	,,	6	6	Do. 6 p.c. Pref.	105—115	...
94,876	Dec. 18	4	4	Do. 4 p.c. Deb.	75—80	...
73,620	Sept. 18	8½	8½	Luton Cons. 'A'	115—125	...
107,960	Sept. 18	5½	4	Mid Kent Ord. (£10)	7½—8½	...
298,940	July 31	10	10	Oxford & District Ord. ...	135—145	...
47,112	,,	5	5	Do. 5 p.c. Pref.	85—95	...
30,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	100—105	...
126,193	Oct. 30	7½	7½	Peterborough Ord.	140—150	...
64,990	Sept. 18	7½	7	Redditch Ord.	100—110	...
166,880	July 31	8	8	Romford Ord.	110—120	...
40,000	,,	4	4	Do. 4 p.c. Pref.	85—90	...
44,000	Sept. 18	5	5	Do. 5 p.c. Deb.	95—100	...
38,570	July 31	5¼	5½	Rugby 5½ p.c. Pref.	95—105	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	100—105	...
42,750	Dec. 11	5½	5½	Do. 5½ p.c. Deb.	103—108	...
110,950	Aug. 21	8	8	Ryde Ord.	110—120	...
279,886	Sept. 4	7	7	Slough Ord.	100—110	...
21,000	Dec. 11	5	5	Do. 5 p.c. Deb.	92—97	...
28,872	Nov. 6	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	14/—16/-	...
28,066	Sept. 18	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	14/—16/-	...
117,228	Aug. 21	7	5	Swindon Cons.	70—80	...
60,425	Dec. 18	5	5	Do. 5 p.c. Deb.	92—97	...
64,380	,,	5	5	Torquay & Paignton 5 p.c. Pref.	82—87	...
130,000	Aug. 21	8	5	Wakefield Ord	85—95	...
81,650	,,	5	5	Do. 5 p c. max.	75—80	...
82,000	July 31	6	6	Weymouth Ord.	80—90	...
273,626	Aug. 21	7	7	Wolverhampton Cons. Ord. ...	95—105	...
98,384	,,	6	6	Do. 6 p.c. Pref.	105—115	...
160,000	Dec. 18	5½	5½	Do. 5½ p.c. Red. Deb. ...	100—105	...
106,490	Aug. 21	5½	5½	Wrexham Ord.	70—80	...
90,000	Dec. 18	5	5	York 5 p.c. Red. Deb.	95—100	...
133,640	July 31	6¼	6	Yorktown (Cam.) 5 p.c. Cons.	80—90	...
120,000	,,	5	5	Do. 5 p.c. Pref.	85—95	...
35,000	Dec. 18	5½	5½	Do. 5½ p.c. Deb.	103—108	...

BRISTOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week
347,756	July 31	6	5	Bath Cons.	105—109	-2½
1,667,250	,,	5	5	Bristol, 5 p.c. max.	97—100	...
120,420	Dec. 18	4	4	Do. 1st 4 p.c. Deb.	88—92	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	88—92	...
328,790	,,	5	5	Do. 5 p.c. Deb.	108—112	...
274,000	July 31	5	5	Newport (Mon.) Ord.... ...	93—95	...
13,200	Sept. 4	8½	7	Pontyp'l Gas & W. 10 p.c. 'A'	12—13	...
13,600	,,	6	5	Do. 7 p.c. 'B'	10½—11	...
40,000	,,	6	5	Do. 7 p.c. 'C'	10½—11	...
140,778	July 31	5	5	Weston-super-Mare Cons. ...	93—98	...
64,338	Dec. 27	4	4	Do. 4 p.c. Deb.	90—95	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	140—150	...

LIVERPOOL EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week
157,150	July 31	6½	5	Chester 5 p.c. Ord.	100—103	...
92,500	Dec. 18	4	4	Do. 4 p.c. Pref.	80—84*	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	85—88*	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—99*	...
2,167,410	Aug. 21	6	6	Liverpool 5 p.c. Ord.	101—103	...
245,500	Dec. 18	5	5	Do. 5 p.c. Red Pref. ...	94—99*	...
306,083	July 17	4	4	Do. 4 p.c. Deb.	99—101	...
106,280	July 31	10	10	Preston 'A' 10 p.c.	174—184	...
188,219	,,	7	7	Do. 'B' 7 p.c.	126—136	...

NEWCASTLE EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week
122,577	Aug. 21	7	7	Blyth 5 p.c. Ord.	115—120	...
732,000	Aug. 21	3	3	Hartlepool G. & W. Co. & New	65—66	...
2,061,315	July 31	5½	5	Newcastle & Gateshead Con.	18/9—19/3a	...
682,856	,,	4	4	Do. 4 p.c. Pref.	87—89	...
776,706	Dec. 27	3½	3½	Do. 3½ p.c. Deb.	78—80	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	98—103	...
332,351	Aug. 21	6	6	Sunderland 6 p.c. max. ...	100—110	-10

NOTTINGHAM EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week
542,270	Aug. 10	9	6	Derby Con.	100—110	...
55,000	Dec. 18	4	4	Do. 4 p.c. Deb.	98—103	...
20,000	June 19	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	100—105	...

SHEFFIELD EXCHANGE

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Jan. 12	Rise or Fall on Week
10,000	Aug. 21	10	10	Great Grimsby 'A' Ord. ...	170—180	...
6,500	,,	10	10	Do. 'B' Ord. ...	170—180	...
79,000	,,	10	10	Do. 'C' Ord. ...	160—170	...
1,806,339	Feb. 20	6½	6½	Sheffield Cons.	119—122	...
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	98—100	...

a The quotation is per £1 of Stock.
* Ex. div. ‡ For year.

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